THE AMERICAN GAS LIGHT JOURNAL INC.

PUBLISHED WEEKLY, AT No. 42 PINE STREET.

VOLUME CI., No. 14. Whole No. 2,052. | NEW YORK, MONDAY, OCTOBER 5, 1914. | Subscription, $3 Per Year. $4 Canada, $5 Foreign.

INDEX TO CONTENTS, PAGE 209 - - - - - - - - ADVERTISERS' INDEX, PAGE 18.

LIBRARY OF CONGRESS OCT 6 1914 SMITHSONIAN

Riter-Conley Manufacturing Company

STEEL CONSTRUCTION

Pittsburgh

THE UNITED GAS IMPROVEMENT COMPANY,

PHILADELPHIA.

BUILDERS OF

THE STANDARD DOUBLE SUPERHEATER

LOWE WATER GAS APPARATUS.

ACCURATE MEASUREMENT

OF

AIR AND STEAM SUPPLY

(PATENTED),

AFFORDING { PERFECT CONTROL OF GENERATOR FIRE CONDITIONS.

PRODUCING { UNIFORM RESULTS. HIGHEST EFFICIENCIES.

THE AMERICAN
GAS LIGHT JOURNAL
INC.

VOL. CI., No. 14. NEW YORK, OCTOBER 5, 1914. WHOLE No. 2,052.

CONTENTS.

An Asterisk (*) Denotes an Illustrated Article.

The Trend in Lighting 209
Proportioning Aggregates for Portland Cement Concrete, by Mr. Albert Moyer 214

OFFICIAL NOTICE—
Transportation Arrangements, American Gas Institute Meeting. 216

EDITORIALS—
Briefly Told 216
American Gas Institute Convention Arrangements—Pacific Coast Gas Association Convention—The War and Public Utilities—Atlantic Gas and Electric Company Failure—Lighting Week, October 19-24.

The Value of Commercial Gas Lighting, by Mr. W. Kennedy 218
*Killing the Burning Gas Well in the Caddo (La.) Oil Field 219
British Gas Companies on the Continent, by an English Contributor 220

NEW METHODS AND APPLIANCES 221
*A New French Meter.

Publications 222
Recent Patent Issues 222

ITEMS OF INTEREST FROM VARIOUS LOCALITIES 222
Gas Lighting, Gardner, Mass.—Inspecting—Central California Reduction—Minneapolis Proposition—Holland, Mich., Officers—Hillsboro, Ills., Enlarged—Mr. Congdon Moved—Balloon Race—Ocala, Fla., Building—Worcester, Mass., Coke—Springfield Meters—Buffalo Gas Company Receivers—Chehalis, Wash., Franchise—Byllesby Properties—Troy, N. Y., Lighting Contract—Rome, Ga., Improvements—Lost—Chattanooga, Tenn., Ovens—Patchogue, N. Y., Taxes—Salem, Mass., Asks Reduction—Overhead Charges.

UTILITIES COMMISSION NEWS 224
Ohio Valuations—St. Joseph Rate Case—St. Paul, Minn., Gas Case—Kansas Commission Unpopular—Pay for Main Extension.

Financial Notes 224
Public Lighting Table for October, 1914.....(Advertising Section) 10
Meeting Times of the Various Gas Associations " 23

The Trend in Lighting.

[From Report of the Committee on Progress, Illuminating Engineering Society.]

Since the last report on progress the developments in the science of illumination and in the lighting industry have continued to an extent which proves that there is no lessening of public interest and no cessation in the demand for improved lighting conditions. The "Safety First" slogan is reflected in the fulfilment of the requirements for safety lamps in mines. The detrimental effects of glare have been recognized and an effort made to avoid them in the headlights of automobiles. The very considerable increase in the intensities available in both gas and electric sources has made possible to a much greater extent the use of diffusing globes and shades, and stimulated the demand for artistic fixtures. Recognition of the scientific side of illumination has grown and there is more and more a tendency on the part of those who control the lighting of buildings, stores, etc., both owners and architects, to take into account the principles promulgated by this Society.

GAS LAMPS AND APPURTENANCES.

Burners.—What is claimed to be one of the most important developments since the introduction of the gas mantle is a new type of burner. Application is made of a recently discovered principle, and the result is a lamp in which the operating costs are practically cut in two, and the necessity for the use of cylinders avoided. The kinetic energy of the gas is fully utilized to secure uniformity of mixture, which is accomplished by providing scientifically designed stream lines for the gases. For residental work very small mantles are used, giving approximately 30-candle power and which are considerably stronger than the older types. These mantles are used in clusters of 3, so that in case of accident to one, illumination is not completely shut off.

Another innovation in burners utilizes experimental data indicating that in the bunsen burner the highest temperature is immediately above the points of the small green inner cones; leading to the construction of an inverted burner in which the nozzle is covered with a fine net which forms the desired green cones and the mantle lies immediately below them. The gas consumption of the lamp is given as 0.69 litre per candle-power, a figure approaching results obtained with high pressure gas.

Use of the regenerative principle is made in another new burner. The secondary air is passed through a heating chamber, heated directly by the products of combustion, and is delivered to the lower surface of the mantle. Efficiencies as high as 50 candles per cu. ft. (0.28 cu. m.) of gas (mean lower rating) have been obtained with burners using this principle.

The high pressure lamp using fused silica for the globe or cup has been further developed. The increased temperature of the burner nozzle owing to the proximity of the cup and consequent concentration of heat, required a search for suitable material which has recently been found. The tendency to explode the contents of heater and mixing tube on turning off the gas has been remedied by enriching the mixture beyond the explosive range at the moment of extinction. Improvements have been made in the design of the lamp both from the utilitarian and aesthetic standpoints.

A new method which claims to increase the life and light giving power of gas mantles consists in dipping them into a solution of kaolin and permanganate of potash. It is then thoroughly dried at a moderate temperature and may be burned off and used immediately or laid away. In order to preserve the mantle it is recommended that the immersion be repeated, two immersions sufficing to increase the life and usefulness much beyond the average.

An elaborate investigation has been carried out on the influence of the form of the mixing tube, on the injector action, and heating effect on the tube, in mantle burners. One of the results reached is that for the ordinary low pressure burner which takes in the primary air of its immediate surroundings without suction, the best operating conditions are obtained if the air openings taken collectively are kept at least three times the area of the cross section of the lower mixing tube opening. A complete explanation has been worked out for the fact that a conical enlargement of the mixing tube remedies the objectionable heating (objectionable from the standpoint of thermodynamics) in the case of those burners whose air-gas mixture becomes heated on its way to the mouth of the burner Furthermore it has been shown that a mixing tube made up of a series of cylindrical

pieces of progressively increasing diameter is completely equivalent to a conically diverging tube.

Automatic Lighters.—The making of automatic gas lighters continues to interest inventors and during the year a number of new devices have been described. Among these are a pyrophoric distance lighter which causes a cerium-iron block to be rasped by a file in the form of circle, controlled through a toothed wheel and rack by a solenoid. An electric type has a by-pass and a heated platinum wire. Another pyrophoric device is arranged on the chain pull system.

Abroad automatic ignition has found considerable favor, but until recently has not gained much headway in this country. However two systems are being introduced which look promising and have met with some success. One uses a valve operated by a change in pressure in the line leading to the lamp; while in the other a small auxiliary gas line is used to operate the valve.

A foreign system of electric ignition has been developed in which current at low pressure is carried from the point of control to the fixture, where, by means of a miniature induction coil, it is stepped up to the sparking point. An improvement on this device, worked out in this country, utilizes the low voltage supply to operate the valve and the high voltage to produce the spark, the whole apparatus contained in a small receptacle which can be placed in the canopy of the fixture.

Tubing.—A most important auxiliary of the portable gas lamp is the connecting tubing, generally of rubber. As the result of experiments with lime, glycerine, and powders, a new tube has been developed which is claimed to be quite impermeable to gases and will last several years without serious depreciation. The heat resistance is good, its pressure-resisting capacity greater than that of rubber, and its cost is low.

Carbureted Air.—Where coal is dear and petroleum or gasolene abundant, the use of carbureted air for village lighting has seemed highly desirable owing to the inexpensive plant required, but technical difficulties have heretofore stood in the way. A new procedure eliminates many of the former difficulties by carbureting the air in immediate proximity to the burner instead of doing so at the works. The main distribution system then becomes one of compressed air, with carbureters at stations in different parts of the area supplied.

Kerosene Incandescent Lamp.—A successful wick-feed kerosene incandescent lamp has been perfected and is being introduced for rural lighting in this country.

Electric Incandescent Lamps.

Non-Vacuum High Efficiency Tungsten Lamps.—Last year's report contains a brief statement heralding the advent of the high efficiency tungsten lamp, and its introduction in a wide variety of sizes constitutes the most marked development in the sphere of the electric incandescent light. The spirally-wound filament in an atmosphere of neutral gas has made possible a higher temperature and a consequent considerable increase in light intensity, while bringing the source itself into such a relatively small space as to enhance its value for searchlights, in projection lanters or with focusing reflectors. At the time of the 1914 report of the Lamp Committee of the National Electric Light Association these lamps were available in the following sizes: for multiple burning on the 100-130-volt circuits 400, 500, 750 and 1,000 watts or in candle power 535, 715, 1,250, 1,820; for series burning the number of units was larger, ranging by moderate steps from 60 to 1,000-candle power with a voltage range from 6 to 550 and in amperes of 5 5, 6 6, 7.5 and 20. Subsequently this listing was extended considerably, and changes in schedules of these new lamps have followed each other with such rapidity that before this report is published there will doubtless be others available.

In Germany the 50 volt, 110-volt and 220-volt types were advertised late in the fall. These lamps were tipless and contained nitrogen at an absolute pressure of about 9 pounds per square inch. The new high efficiency lamp is being used in German theatres, and in this country in many places requiring very intense sources, such as display lighting and for the lighting of large areas. It is a strong competitor of the ordinary arc lamps and high power gas arcs. Efforts are being made to develop this lamp for use in moving picture machines where steadiness and high intensity are important.

Investigations of the properties of this new lamp indicate a reduction factor in the neighborhood of 0.850, a temperature of approximately 2,600° C. and a ratio of radiated energy to energy input of 60 per cent. as compared to 88 per cent. for the ordinary vacuum type tungsten lamp. A study of the energy distribution showed the wave length of maximum energy to lie close to 1.1 μ (μ = 0.001 mm.) and the ratio of luminous to total energy radiated to be approximately 8 per cent. as compared to 4 per cent. for the vacuum lamp. The ratio of energy radiated in the visible part of the spectrum to the energy input is approximately 5 per cent. as compared with 3.5 per cent

Vacuum Tungsten Lamps.—Since the first of the year there has been a 10 per cent. increase in efficiency in the ordinary drawn-wire tungsten lamp accompanied by a decrease in price from 10 to 15 per cent., and there is a steadily increasing tendency of central stations to further the use of the tungsten lamp by free renewals and decreased prices. The quality of the lamps has been greatly improved. The filaments have been made stronger; a change has been made from heavy to light semi-flexible or flexible supports; and the introduction of chemicals to prevent blackening has been extended to the lower wattage and been greatly improved in the higher wattage sizes.

Among foreign manufacturers a number of filament mountings have been worked out. One giving a maximum intensity in the lower hemisphere consists of a rectangular glass frame from which the supporting wires hang, the filament being wound back and forth so as to lie in the same horizontal plane, the lamp being used pendant. The ability to wind the drawn wire into spirals of very small diameter has made possible a variety of methods of mounting. An arrangement giving a result similar to the one just mentioned consists in placing the supporting wires radially in the same horizontal plane and looping the filament between them. Another type uses three vertical glass rod supports with the filament wound spirally around them. Another has the supporting wires in the same plane and forming a four pointed star. In another the filament is in the form of an inverted cone, and the bulb is either clear or has its upper half frosted and the lower half ribbed. One type uses the grid form mentioned with the spirally wound filament. In still another type to get a maximum length in a minimum space vertically and thereby permit the use of a small diameter bulb, the spiral wound wire is held by supports which carry it spirally around the central glass supports.

This year has seen the almos t complete elimination of the tantalum lamp, the number used being less than 0.1 per cent. of the total number of lamps sold, while the number of carbon lamps used has dropped to 10 per cent.

The advent of the high efficiency non-vaccuum lamp of high current has necessitated the development of special holders to provide ventilation and protection from moisture. In the case of the low voltage high current type, a compensator for street series lamps has been produced which in some cases effects an appreciable saving in energy.

Various devices have been invented to prevent the unauthorized removal or theft of lamps and reflectors. One of these recently developed is so arranged that a lamp once screwed in cannot be removed without breaking it. Replacement of a lamp is accomplished by breaking the bulb, which allows the slipping off of the outer shell of the socket, and permits the unscrewing of the discarded base.

Arc Lamps.—The result of considerable research has brought out an improved electrode for the magnetic arc. This, with a prismatic refractor which redirects light formerly lost, has made a big advance in the mean hemispherical efficiency of this type.

Improvements have been made also in the flaming carbon arc. A new type has been developed in which the lamp forms the top of a pillar and which combines the operating characteristics of the long burning arc with the ornamental design inherent in the adoption of the classic column. Research has shown that good operating results may be secured by the use of a small condensor having vertical, concentric sides.

In response to the demand for ornamental units, the appearance and diffusion of arc lamp globes have received some attention with beneficial results.

In enclosed flaming arc lamps the effects of water in the enclosing globes has been studied recently. It was found that one effect is to lower the temperature of the arc, due to the formation of hydrogen, which rapidly conducts heat away from the electrodes. It was found also that there is a remarkable shortening in the life of the trim if moisture is present in the globe.

Vapor and Vacuum Tube Lamps.—Mercury-vapor lamps in general, function on direct current. Those designed for alternating current are arranged so that the final result is a unindirectional action. A new type of quartz mercury arc has only two electrodes, between which the current alternates. This is made possible at ordinary frequency by using voltages not less than 600; a pressure not less than

order of 1 cm. of mercury; the presence of self-induction in the circuit; and when starting having the electrodes already hot. A. lamp of this type has been designed for 1,000 volts at the terminals, 1,000 watts consumption, a power factor of 0.7 and a candle power of approximately 5,000 giving a candles per watt factor of ¼. Another arrangement of the quartz mercury arc has for its object the production of a light source comparable in intensity with the carbon arc but with the objectional heating removed. This is accomplished by making the lamp in the form of an inverted U and placing it in a flask, one of whose walls is in the form of a paroboloid, which may be silvered, and thus concentrate the light emitted through the opposite wall. The flask is made of pure transparent quartz and uses elec trode of invar metal. The whole is then immersed in a vessel either of glass or with glass sides, filled with water. One of the sides may be made in the form of a condensing lens. A lamp so constructed used 18 amperes with 70 volts at the terminals and was claimed to give 3,000-candle power or about 0.43 w.p c. Such a source would have its principal application in cinematography or photomicrography.

Neon.—Work is still being done on the study of the properties of the neon lamp. It has been found that, the current being kept constant, the drop in potential along the tube is approximately inversely proportional to the diameter, the tube operating under a pressure of about 2 mm. of mercury and a current density of 6 amperes per square decimeter. The effect of varying the diameter has been studied and it has been found that the luminous power increases approximately as the first power of the diameter. Owing to the loss of power at the electrodes, however, tubes of a diameter of about 1 to 3 cm. are best if efficiency is to be considered.

In England the neon tube has been put on the market for advertising purposes in a standard length of 6 m. a diameter of 50 mm,, and using 1 ampere with 1,000 volts at the electrodes.

Cathode Lamp.—A new vacuum lamp is based on the fact that the cathode in a vacuum tube becomes very hot on the passing of a discharge. The inventor uses this phenomenon to bring to a glow a piece of Nernst heater used as a cathode and contained in a quartz tube, sealed by means of magnesia and pipe clay into a spherical glass bulb.

The claim is made that with 820 volts and 0.11 ampere, or 90 watts, the lamp burns as brightly as a 50 candle-power lamp.

Ultra-Violet Sou-ces. — For some time quartz mercury-vapor lamps, heavily loaded, have furnished the only intense source of ultra-violet radiation in practice. A method has been devised which considerably increases the effectiveness of such lamps by using a magnetic field and water cooling. This has the effect of reducing the density and consequent absorption of the vapor envelope, and shifts to the side of the tube the concentrated beam of light which ordinarily occupies the center.

A study of the oscillating spark between various metal electrodes as a source of ultra-violet radiation has shown a maximum intensity when using invar, the value being almost twice that obtained with copper.

Light Sources for Projecting Purposes.—Headlights.—The enor mous increase in the use of automobiles makes the question of proper headlights of importance. In the larger cities legislation to prevent the use of dazzling lights has been put into effect. One result is the development of schemes to shut off the excess of light while in the city, leaving the full intensity available on unlighted roads. Instead of using four headlights, two of high power for country touring and two lower power for city driving, one arrangement provides twelve lights placed along the filler board between the wind-shield and the top of the engine hood. When not in use the lamps are completely covered by a sliding shutter which may be moved to permit the use of as many as desired. The angle of the group of lamps can be varied so as to illuminate any portion of the road, or the engine of the machine. In another system, two lamps are used, having a tubular body, fitted with a system of lenses and a reflecting mirror, the result being a concentrated beam projected in nearly parallel rays, and capable of easy direction. Another has two pairs of translucent wings on pivots made to open and close by a push button on the dash.

The National Physical Laboratory recommends the cutting off of the light beams coming from the upper right hand corners. The right hand corner is indicated because in England the rule of the road is to the left.

In locomotive headlights a similar state of interest is evident, and the need for definite information as to needs in this direction is evidenced by the fact that 28 States have adopted legislation embodying seventeen different laws governing their use.

Searchlights,—A big advance in searchlight construction is a new type which has small electrodes, operates at a high current density and temperature and has an improved specific consumption. The current density is about six times that of earlier types of lamps. This is accomplished by forcing alcohol vapor around the electrodes to act as a cooling medium and protect them from too rapid combustion.

Signal Lights.—A striking departure from former methods of railway signaling is forecasted in the tests made to determine the right intensity of a lamp so that it will be clearly visible in bright sunlight and not too dazzling at night. If experience proves the system to be as effective as the preliminary tests indicate, the semaphore arm for daylight signaling will become obsolete on electric roads.

The method of momentarily obtaining high intensity by using a tungsten lamp at voltages much above normal has been utilized in a signaling device for soldiers and airmen. It consists of a minute incandescent lamp in conjunction with a parabolic mirror so arranged that the circuit can be closed intermittently to give long or short flashes, corresponding to the dots and dashes of the Morse code.

Another use of lamps for signaling is in connection with city traffic. A scheme is being tried in Cleveland of directing traffic at busy street intersections by red and green lamps on cross arms on 15-ft. poles at the four corners. Control is by the traffic policeman in a booth.

Miner's Lamps.—The past year has seen a remarkable development in safety lamps. In a competition in England 195 portable lamps were submitted and of these a number were accepted. By a prize competition in Germany, a lamp has been evolved which is not only safe if broken but also gives indication of the presence of fire damp. The principle on which the indicator is constructed is based upon the law of diffusive action. The indicator consists of a U tube containing a colored signaling fluid and so disposed that the presence of gas causes an obscuration of the light.

In this country developments have proceeded along two lines, lamps designed for mines where fire damp or other explosive gases are encountered, and those for ore mines where these difficulties are not found.

For mines where the question of explosive gases does not have to be considered the use of acetylene has been growing. Until recently the acetylene lamp has been developed for eastern mining conditions and has been of the hat or hand type. But in timbered mines the hat lamp is not used and recently an acetylene lamp has been brought out mounted in a hafted holder, so that the lamp can be positioned by sticking into the timber or soft ground. An effort is being made to obtain an acetylene lamp for use in gaseous mines and in Geneva a prize of $1,000 has been offered for a safety lamp that fulfils all requirements, both as to gas protection and technical and economical working.

Street Lighting.—The constant demand for better public lighting is reflected in the increase in installations in some of the large cities of the country, during the past year. The luminous arc was being installed in large numbers up to the time of the introduction of the non-vacuum high efficiency tungsten lamp, but there is considerable evidence that the latter will be used in many places to replace the former.

The following table shows the changes in Chicago:

	June 1, 1913.	June 1, 1914.
Arc lamps	17,084	18,973
80-watt tungsten lamps	814	4,433
Gas lamps	12,714	11,761
Gasolene lamps	7,845	5,120
25-watt subway lamps	302	4,409

In Philadelphia the number of arc lamps used increased from 14,-421 to 14,425, while there is a regular yearly increase of 300 in the number of gas lamps. The cost of arc lamps decreased 5 per cent. per lamp. Gasolene lamps remained unchanged in number and price per lamp.

Abroad gas lighting maintains its popularity as a street illuminant. In Paris in particular high-pressure lighting has been making con siderable gains, as may be seen from the following table.

High-pressure gas lighting has also made gains in England; and at Edinburgh an experimental installation of 16 lamps has been made, replacing 36 of the ordinary type. They are lighted and extinguished automatically, and several have been provided with two burners, one of which is extinguished at midnight.

Number of Lamps.

Year.	600-cp.	1,000-cp.	2,000-cp.	4,000-cp.	Total.
1910..... ..		7	68	29	104
1911....		7	305	68	380
1912..... ..		38	315	117	470
1913.....	16	193	875	159	1,243

At Leeds the high-pressure system is to be extended. Glasgow has been extremely progressive on the street-lighting question, and there has been since 1895 an increase in the number of gas lamps from 13,672 to 106,684, while electric lamps have been introduced to the number of 5,116.

In London 430 arc lamps have recently been added to the square mile embraced in the original city. A distinctive feature of the globes is the inclusion of a dioptric lens to aid in the distribution of the light horizontally and downward.

Specifications.—The question of street-lighting specifications is a prolific source of argument and difference of opinion. A recent extended discussion in England served only to emphasize the lack of unanimity on the part of lighting engineers as to the requirements for satisfactory street illumination. The problem has been attacked in this country by a committee of the National Electric Light Association and the Association of Edison Illuminating Companies along lines somewhat different from those previously employed. It was assumed that the fundamental purposes to be served by street illumination are:

1. Discernment of large objects in the street and on the sidewalk.
2. Discernment of surface irregularities in the street and on the sidewalk.
3. Good general appearance of the lighted street.

Two actual streets were equipped for observation under working conditions and comparative tests have been developed to determine which lighting systems serves each of the above-mentioned purposes the better. In the past, tests of street lighting have been confined almost exclusively to photometric measurements on horizontal or vertical planes. In the tests in question, observation was made the principal point of comparison, but complete photometric data were also taken comprising candle-power of the illuminants and measurements of the horizontal and vertical illumination and of brightness. Final results have not yet been obtained.

Public Interest.—That the public is beginning to recognize the desirability of good lighting is indicated by the recent action of a club in one of the large cities, which appointed a committee to investigate the question of street lighting and make recommendations to the city council. In another city a "Municipal Lighting Day" was held for the benefit of city officials and others interested in the conduct of municipal affairs. It included lectures and demonstrations of street lighting.

Exterior Illumination.—The results obtained in the artificial lighting of tennis courts has caused a considerable extension of this form of lighting. In England covered tennis and squash courts have been artifically lighted, both with high pressure gas units and electric lamps. An experiment with artificial light to increase the output of a poultry farm reported an increase of 30 to 40 per cent. in eggs laid. The light made young incubated chicks feed longer and thereby accelerated their growth during the winter months by a third.

Aeronautics has created the need of illuminated fields for rising and descending at night. A need has arisen for illuminated signals, so that an aeronaut traveling at night may determine his location and avoid danger in descending. For signal light on the machines, arrangements must be made to indicate not only the direction of travel in a single plane but also whether the rise or drop is contemplated.

The logical development of the animated sign has made its appearance in the use of moving vehicles carrying highly illuminated displays. The lighting of Christmas trees in the home is a custom almost as old as the tree itself. A recent innovation adopted by many cities consisted of out-door "community" trees, in which illumination was a conspicuous feature of the ornamentation.

There has been a decided increase in buildings lighted on the exterior for display purposes. In the past there have been numerous cases of so-called "outline" lighting. A new method called "flood" lighting is being introduced in which the exterior of the building is brilliantly illuminated by sources placed at a distance.

While high towers for street illumination were discontinued some years ago, the system has been revived for lighting railroad yards, using steel towers 100 feet high at 500 feet intervals and equipped with quartz mercury-vapor arc lamps.

Interior Illumination.—Improving the lighting of railway and street cars continues, indirect and semi-indirect methods being studied. There is a general recognition that bare lamps are bad and that it is well to use reflectors.

Store Lighting.—That the educational efforts of this society are continuing to bear fruit is indicated in the lighting installation of large department stores. Window lighting systems are worked out with foot lamps and border lamps equipped with movable color screens, so that the quality of the light could be altered to suit the requirements. The main lighting, of the semi-indirect type, has also a modified color value. To eliminate the annoying reflections from the glass of show windows, a new system has been devised in which the pane is made concave inward.

A novel application of indirect lighting has been made in banks where the lamps are in troughs along the bank rail over the teller's desks.

School Lighting.—During an extended discussion before the British I. E. S. on daylight illumination in schools, it was brought out that as a minimum actual illumination on the desk for reading in the school room in full (midday) daylight, different authorities recommend from approximately 1 to 8 foot-candles. Among the new suggestions were, the determination of the 'sill-ratio', *i. e.*, the ratio between the illumination on the window sill of the school room and that on the desk most remote from the window, as a means of determining the access of daylight into schools; experiments to ascertain how far it is possible by using small models to predict the actual daylight conditions in an interior; and an 'indicator-photometer' as a means of signalling when the artificial light should be turned on.

Church Lighting.—There is a growing tendency away from the old belief that the interior of a church should be in a state of twilight illumination. Indirect lighting is growing in favor although the lower installation and operating costs, and the architects' influence, are responsible for the use of direct lighting in some new churches.

Picture Lighting.—The proper lighting of pictures has been a vexing problem for years. While it is comparatively easy to see what is required for a single picture, to produce the result not only for one, but many has taxed the resources of engineers and architects. At a recent exhibition an effort was made to illuminate the pictures by light coming from the right direction and also of the proper color content. Plain and colored lamps were used, in troughs above and in front of the frames and so arranged that no light was specularly reflected to the eye.

Photometry.

Heterochromatic Photometry has had the most attention during the past year. The continued increase in the temperature at which incandescent lamp filaments are operated has accentuated the difference in color between these lamps and the carbon lamps used as standards.

The study of the flicker photometer has been continued. Some recent experiments have been made indicating that the time element in the growth of color sensations will explain the reason for weighting red light more than blue green light when comparing the flicker method with the direct comparison method. On the other hand, a comparison, using the two methods, of two lights of the same resultant color, one having a continuous spectrum the other made up synthetically, gave the same result in both cases.

The method of employing colored solutions as filters is well known. A recently described application consists in the use of two wedge shaped glass cells, one of which contains copper sulphate, ammonia and distilled water, and the other iodine, potassium iodide and water. By properly varying the position of the wedges an infinite number of color changes can be produced in the light falling on the photometer and coming from the comparison source.

Another method suggested for use in heterochromatic photometry utilizes the extreme sensibility of the peripheral retina to brightness contrast. The apparatus includes a vertical screen with an opening at its center, a series of rotating measuring disks made up of sectors of grey and black in varying proportions, and a photometer bar.

Methods.—The use of fluorescence as an indicator of spectral radiation forms one of the latest additions to photometric methods. Radiation from the two sources enter opposite sides of a vessel containing a fluorescent solution of known constitution and absorbing qualities. The point at which the intensity of fluorescence is the same as noted on a moving carriage.

The use of ruled gratings for cutting down intensity in photometric work was developed some years ago. A modification consists in placing one in front of another with their lines parallel; one grating fixed and the other movable in a direction perpendicular to the lines. Thus an effective absorption is obtained from 50 per cent. to 0.

Photo-Electric Cell.—The search for an objective photometer to take the place of the human eye in measuring light intensities continues but with questionable success. Abroad a recent study of the photo-electric cell gave apparently satisfactory results. Filters were used such that the maximum sensitiveness occurred at the same point in the spectrum as with the human eye. Differences of not more than 6 per cent. were found when measuring the candle power of various lamps with the cell and with an ordinary photometer.

The whole question of the practicability of the photo-electric cell in photometry has recently been thrown open, however, by results of an investigation of gas-filled cells, which seems to show that this cell is not as satisfactory as has been considered. The illumination current relationship, formerly considered linear, is shown to be a highly complicated function of a number of factors.

The results of another investigation indicate that the photo-electric effect of potassium is to be explained by the considerable gas assimilation of this material, i. e., that the existence of gas is a necesssry condition for appreciable photometric effect. The correctness of this conclusion is questioned, however, in consequence of some later measurements on freshly cut sodium surfaces in vessels containing residual gases and in others using an extremely high vacuum.

Selenium.—It has been hoped that the selenium cell might be the solution of objective photometry. But no advances in this direction have been made during the past year.

Standards.—The question of light standards has not been agitated much and but little has been done looking toward the establishment of the ultimate primary standard.

The use of the Hefner lamp as a standard is limited in this country, but abroad it enjoys considerable popularity. During the year 1913 85 lamps were submitted for test, the total number submitted since the beginning of certification in 1892 being 2,079. In addition to the Hefner lamps, 78 carbon lamps were tested for use as photometric standards and 333 metal filament lamps.

At the National Physical Laboratory in England the international comparison, through the United States Bureau of Standards, the Laboratoire Centrale in Paris and the Reichstanstalt in Berlin, of high efficiency incandescent lamp standards have been completed. Measurements made at the laboratory after the return of the lamps showed that their candle power had remained constant enough to ascribe an accuracy of 0.25 per cent. to the results. The ratios obtained were as follows:

$$\frac{\text{Reichsanstalt}}{\text{Nat. Phys. Lab.} + 0.9} = 1.00 \qquad \frac{\text{Bur. of Std.}}{\text{Nat. Phys. Lab.}} = 0.99$$

$$\frac{\text{Lab. Cent.}}{\text{Nat. Phys. Lab.}} = 0.99$$

In these comparisons a color difference was entailed corresponding to that between a carbon lamp at low efficiency and a tungston lamp at 1.25 watts per mean horizontal candle.

A portable electric standard for use in measuring the candle-power of gas employs a 4-volt tungsten lamp at 2 w. p. c. and is based on the property of tungsten rapidly changing its resistance with change in current. The lamp is made one arm of a Wheatstone Bridge and is brought to its rated candle-power by changing a rheostat until the galvanometer gives zero deflection.

Glarimeter.—Under the head of photometry might be mentioned a new instrument called a glarimeter, designed to measure the relative glare or gloss of paper. It was found by experiment that light reflected at an angle of 57.5° from pieces of glazed white paper, calendered black cardboard, calendered white paper and brown solio paper showed a plane polarization 99° complete. It is a characteristic of most glass surfaces that light reflected from them at this angle, 57.5°, is almost completely plane polarized. The instrument, then, was designed to measure the glare by determining the fraction of the light reflected from the paper at an angle of 57.5° which is polarized, the illumination falling on the paper at approximately this same angle. An interesting test made with this instrument showed that the effect of passing a sheet of unsized newspaper through the calendering rolls twenty-nine times increased the per cent. glare from 27.7 to 64.8.

No conclusions have as yet been reached on the question of nomenclature, but in England the 1910 report of the Committee on Nomenclature and Standards of the Illuminating Engineering Society (U. S.) has been made the basis of a considerable discussion. The results of this discussion, which was participated in by members in other countries, show that there is still a wide diversity of opinion on this subject and emphasizes the necessity of such a body as the International Illumination Commission to which problems of this character may be referred.

International Illumination Commission.

The most important advance in illuminating engineering as a whole came just before the last convention and was forecasted in last year's report.

At the fourth meeting of the International Photometric Commission in Berlin, Aug. 27, 1913, a re-organization was effected in which delegates from ten countries participated and formed the International Illumination Commission.

In this country a National Committee had been formed prior to the establishment of the International Commission, composed of two representatives from each of the following societies: The Illuminating Engineering Society, The American Gas Institute and the American Institute of Electrical Engineers, while the American Physical Society was informally represented.

Globes, Reflectors and Fixtures.—There has been a great increase in the variety of reflecting and diffusing equipment available for lighting proceeding along artistic lines, engineering lines, lines of special adaptation to particular needs, lines of higher and lower priced units and of large and small units. This increase in variety is particularly noticeable in the semi-indirect field. There is also a tendency by manufacturers to put out units which approach direct lighting in diffusion results, but having the appearance of a semi-indirect lighting unit. This emphasizes the need of some other terms than indirect and semi-indirect to apply to lighting systems.

There is a greater tendency in the design of globes and reflectors to have them particularly adapted to architectural needs and particular classes of service.

From an engineering standpoint the most marked developments are those involving the use of semi-indirect fixtures for both gas and electric lights. The high intensities of the new types have made the need for the use of diffusing globes more apparent. In the units for these lamps ventilation is an important feature, and in the case of gas lamps, mica sheets are used to baffle the heated products horizontally and thereby prevent ceiling discoloration. Mica baffles are also used in gas lamps below the source to prevent over-heating of the glassware.

In industrial lighting there is a notable tendency to the use of deep bowl reflectors. In street lighting a prismatic refractor has been developed which gives a very extreme distribution of light, the candle-power being highest at about 75 to 80° from the vertically downward direction. The extent to which the artistic in fixtures has progressed is shown in the production of a dome made of china by a manufacturer of dinner sets.

Mention was made in last year's report of the use of marble in thin sheets to replace glass. A big improvement in this material is shown in the production of plates $\frac{1}{8}$ inch to $\frac{1}{4}$ inch thick impregnated with oils at high pressure and temperatures. The treated marble was found to transmit more red and much more blue than milk glass and is a good diffusing agent even though having a transparency of 40 per cent.

A further extension of the daylight duplication idea is found in the development of spectacles of colored absorbing glass. Different spectacles are designed for different light sources, the materials used being the same as those required to make an artificial daylight lamp out of the source.

Fixtures have also been designed which give a light distribution in a room similar to that given by a window, imitating daylight distribution.

The importance of avoiding glare is being appreciated to such an extent that spectacles using colored glass have been devised for attachment to the visor of a base ball players cap. They are instantaneously adjustable and should be of considerable help to the player when it is found necessary to look directly toward the sun.

Physiology.—The action of radiant energy which enters the eye, has been studied showing the relative amounts of energy absorbed by the various eye media and how the absorbed energy varies with the temperature of the source. Thus it was found that in the total eye about thirty times as much energy is absorbed per lumen of tungsten

light as per lumen of light from a black body at 5,000°. Some work on visual acuity under monochromatic light from the middle of the spectrum as compared with ordinary daylight showed considerable advantage in favor of the former. Results were also obtained indicating that yellow green eye glasses have a marked effect in improving visual acuity in very bright daylight.

The final results of the extended research of the Glass Workers Cataract Committee of the Royal Society, to find a glass that will cut off as much as possible of the radiation beyond both ends of the visible spectrum and still be transparent to the visible, have been published. Glasses have been prepared that cut off more than 90 per cent. of the heat radiation, are opaque to the ultra-violet and sufficiently free from color to be capable of use as spectacles.

The relative hygienic effects of gas and electricity when used for lighting purposes has again been made the subject of investigation. The room used was 2 m. high, 1.25 m. long and 0.6 m. wide and the results have been variously interpreted depending on whether the critic admits that conditions in a chamber of this size are or are not comparable with those in ordinary living rooms.

Legislation.—Distinct progress in settling a controversy which has been agitated for many years is seen in a recent parlimentary action in England. The question whether gas should be judged on a basis of its calorific or its illuminating power has been a prolific source of argument. Charters have been issued recently to two gas companies specifying a calorific standard as a basis for test. Unfortunately there seems to be still a decided difference of opinion as to just how this calorific standard should be specified, but doubtless this will be settled after further research. In this country the Wisconsin Public Service Commission has considered the matter, while in New York the question is still under advisement, although it has been determined that there is no definite relation between the candle-power and heat unit value. Hence it follows that in changing laws which specify candle-power, it will not be fair to adopt a specific factor to fix the calorific value from the value of luminous intensity.

Proportioning Aggregates for Portland Cement Concrete.

[From a paper by ALBERT MOYER, read before the Society for Testing Materials.]

To arrive at a scientific and at the same time practical method by which to properly proportion the aggregates for Portland cement concrete, we must examine the available aggregates and so graduate them in size of particles that the smallest percentage of voids results and, consequently, that less mortar is required to obtain maximum density and strength. The principal requisite is the making of a sufficiently dense and rich mortar to bind together pebbles or crushed stone by entirely filling the voids. The study of this subject must be more particularly directed towards the proportioning of sand, cement and water. The grains of sand must be bound together and the voids between them filled with cement paste. It is the proportioning of this paste that we must study to determine the quantities of cement and water added to any particular sand.

Portland cement dry, measured losely, shrinks in volume when water is added, and when measured packed tightly, increases only slightly in volume when water is added. Experiments by S. Warren Hartwell indicate that 110 lbs. of Portland cement mixed with 25 per cent. of water are required to produce 1 cubic foot of paste. The cement must be measured by weight not by volume.

There are various methods of determining the cement paste required to fill the voids in the sand: (1) Determinating the percentage of voids by the specific gravity method, and (2) by the volume of water required to fill the voids; (3) determine directly the required paste by measuring the volumes of mortars of various proportions; and (4) making up the mortars into briquettes and breaking them.

1, *Specific Gravity Method.*—To be accurate, the specific gravity of the sand used should first be determined. Then weigh a quantity of sand, compute the volume it would occupy if solid, and thus obtain the percentage of voids. It is fairly accurate, however, to assume that the specific gravity of a well washed quartz sand is 2.65, and to base the computations for the percentage of voids on this figure.

2. *Water Test.*—Provide two 250 cc. graduated glasses. Dry the sample of sand by spreading a thin layer on a pan and heating to over 212° F. When the sand is cool, pour 100 cc. slowly into a graduated glass, jarring the glass by tapping on the bottom and sides while pouring, to expel the air.

In the other glass, put 100 cc. of water, pour the measured sand into the glass containing the water, and note the height to which the water rises. If 100 cc. of solid matter had been added the water would rise to the 200 cc. mark; therefore to ascertain the percentage of voids, deduct the number of cubic centimeters to which the water has risen from 200.

3. *Experiment with Mortors of Various Proportions.*—Provide several graduated glasses 250 cc. or over; and a balance which will weigh accurately to hundredths of an ounce. Pour 200 cc. of dry sand into a glass very slowly, tapping the bottom and sides so that it will settle. Then pour it on the balance and weigh. Measure out several more 200 cc. samples weighing each time as a check on the quantity of sand. Then determine the volumes of cement paste required to be mixed with the 200 cc. samples of sand to give the various proportions under investigation, and measure out the necessary cement by weight, assuming its weight to be 110 pounds per cubic feet. These data, for various proportions, are given in Table I. The following proportions are suggested for investigation: 1-1½, 1-2, 1-2¼, 1-2½, 1-2¾ and 1-3.

TABLE I.—*Weight of Cement Required for a given Volume of Cement Paste.*—1 cubic foot of Paste contains 110 pounds Cement; 100 cc. of Paste contain 6 22 oz. Cement.

Proportions by Volume.	Volume of Cement Paste, cc.	Volume of Sand, cc.	Weight of Cement Required, oz.
1-1¼	133	200	8.27
1-1½	115	200	7.16
1-2	100	200	6.22
1-2¼	89	200	5.53
1-2½	80	200	4.97
1-2¾	73	200	4.55
1-3	66	200	4.11
1-3¼	62	209	3.86
1-3½	57	200	3.55
1-3¾	53	200	3.30
1-4	50	200	3.11

Mix each sample of cement with 25 per cent. of water. Then mix, first, the sample for the richest mixture with a 200 cc. sample of sand, and tamp all of the resulting mortar into the graduated glass, a little at a time, with a flat-end stick. Note the volume occupied by the tamped mortar. Similarly for the next richest mixture, and so on until all the samples have been mixed into mortar and tamped in the glasses.

The object is to ascertain what proportion will produce maximum density with a minimum amount of cement. Since the same amount of sand is used in each sample, it is evident that with too much cement the volume of the mortar will be increased. Therefore, in progression from the leanest to the richest mixture, that sample which first starts to increase the volume of the mortar is the one which contains the correct proportions for that particular sand.

4. *Tests of Briquettes.*—We used 200 cc. of sand in the previous test to obtain sufficient mortar to make three briquettes. By inverting the glass and jarring the top the mortar will be released. Make up each sample into briquettes, store in a moist closet, and break in 7 days. A better test is to make up 2-inch cubes and crush at 7 and 28-day periods.

This test is a check upon the accuracy of the tests for the proportions of cement to sand which will produce maximum density, strength and bonding. The results of the 4 tests should agree.

To illustrate the reliability of the four methods described: A test was made of Rockaway sand from the south shore of Long Island, and 100 cc. of sand, packed tightly in a graduated glass, weighed 5.875 ounces. When placed in 100 cc. of water, the water rose to 262 cc., indicating 38 per cent. of voids. (The sand was so fine that 66 9 per cent. passed through a No. 50 sieve and 98.3 per cent. through a No. 30 sieve.) If the specific gravity of Rockaway sand is 2.65 (it appears to be a quartz sand), the calculated voids are then 37.2 per cent., which checks up the water test. Therefore, the proportions for maximum density, based on 38 per cent. of voids, are 1 part of cement paste to 2½ parts of sand.

Briquettes made of this sand and Portland cement in varying proportions were tested with the following results:

Proportions.	Tensile Strength After 28 Days Lb. per Sq. In.
1-2¼	282
1-2½	334
1-2¾	367
1-2	396

It would appear that the proportion giving good strength is either 1-2½ or 1-2¼, which checks up the water test and the specific gravity test, for 1-2 is unnecessarily strong. The proportion 1-2½ is considerably weaker than the 1-2¼, although it could be used provided the mortar was rich enough in cement to properly bond together the larger sizes of crushed stone. It is evident that the voids in the 1-2¾ mixture have not been filled, and therefore the mortar would be too short, while the 1-2½ or 1-2¼ mixture is sufficiently rich.

Therefore, in using a sand having 38 per cent. of voids, the proportion would be 110 pounds of cement to 2½ cubic feet of sand, or 1 cubic foot of cement paste to 2½ cubic feet of sand. If it is necessary to use the bag (94 pounds) as the unit for measuring the cement, the proportion should be computed as follows:

94 lb. : 110 lb. = 38 per cent. of voids : x per cent. of voids,

from which $x = 44$, which calls for a proportion of 1-2¼.

If screenings or quarry tailings passing through a ¼-inch mesh sieve are used in place of sand, their voids are determined in the same manner as those of sand, but the tailings should be of such size that not more than 20 per cent. passes a No. 50 sieve and not more than 10 per cent. through a No. 100.

A sample of such screenings from Hackensack Meadows, N. J., analyzed as follows:

Retained on	No. 10	Sieve	.....	47.5	per cent.
"	" " 20	"	.....	22.5	"
"	" " 30	"	.....	8.8	"
"	" " 50	"	.....	9.3	"
Passing	" 50	"	.....	11.9	"
				100.0	

The percentage of voids by the water test was 34.

Trap-rock screenings are a good substitute for sand and make a tougher and stronger concrete. Stone screenings such as soft limestone, marble, sandstone, etc., do not make as good a mortar for concrete as good sand.

In proportioning larger aggregates, keep in mind that the voids in these are to be filled with the mortar. It is sometimes best to use two sizes of stone; the smaller size, however, should all be retained on a ¼-inch mesh sieve. In order to ascertain the best mixture of the small or larger sizes of stone or pebbles, make a receptacle which will hold a little over 4 cubic feet (or use a 15-inch sewer pipe). Measure 3 cubic feet of the larger stone and 1 cubic foot of the smaller stone. Mix well together, place in the receptacle and note the space it occupied. Empty the receptacle, measure 2 cubic feet of the larger stone and 2 of the smaller, mix as before and mark the bulk. Vary the proportions in this way, always having a total of 4 cubic feet. The mixture which occupies the least space will make the densest concrete.

To ascertain the percentage of voids in crushed stone or pebbles, make a box of 3 cubic feet capacity, say 1 by 1½ by 2 feet. Dry the material, heating to over 212° F. Weigh the box; throw the stone into the box loose, level off the top with a straight edge and weigh. Deduct the weight of the box from the gross weight and divide by 3. which gives the weight of 1 cubic feet. The percentage of voids may then be obtained from Table II, based on average specific gravities. The stone should contain no screenings and be free from sand. Any particles that will pass a ¼-inch mesh sieve should be screened out and figured as sand.

The percentage of voids being known, the parts of stone required for various proportions of mortar can be found in Table III. For example: Suppose that the sand or screenings requires a proportion of 1 part of cement and 2½ parts of sand to produce maximum density of mortar and sufficient richness for a good bond, and that the stone is a hard crushed granite of 1-inch size, graduated in particles, and weighing 100 pounds per cubic feet. From Table II. we find the percentage of voids in the larger aggregates to be 43. Table III. shows that the proportions for maximum density in such concrete will be 1 part of Portland cement paste (110 pounds of cement for 1 cubic feet of paste), 2½ parts of sand and 5¾ parts crushed granite; or stated in another way, 110 pounds of Portland cement, 2½ cubic feet of sand and 5¾ cubic feet of stone.

A field test may be made by providing 4 lengths of 15-inch sewer pipe and placing concrete. Make up four batches of concrete as follows: If the proportions of mortar to crushed stone ascertained as described, are for instance 2½ mortar, 5 stone, use the same quantity of stone in each sample.

TABLE II.—*Percentage of Voids in Crushed Stone.*

Average Specific Gravity, Weight per Cubic Foot of Crushed Stone. Lb.	2.70 Hard Calcite; Limestone; Hard Marble; Granite.	2.85 Dolomite; Hard Limestone.	2.40 Medium-Hard Limestone; Medium Sandstone.	2.65 Quartzite; Quartz Pebbles; Quartz Gravel.	2.80 Boston Trap; Hard Sandstone.	3.03 Hudson Co. Trap.	2.14 Rockland Co., N. Y., and Ohio Sandstone.	2.60 Flint; Hard Feldspar.	3.25 Hornblende.
80	52.5	55 0	46.5	51.6	54.2	57.6	40.0	50.6	60.5
81	51.9	54.4	45.8	51 0	53.6	57.1	39.3	50.0	60.0
82	51.3	53.8	45 2	50.4	53.0	56 6	38.5	49.4	59.5
83	50.7	53.3	44.5	49.8	52.4	56.1	37.8	48.8	59.0
84	50.1	52.7	43.8	49.1	51.9	55.5	37.0	48.2	58.5
85	49.5	52.1	43.2	48.5	51.3	55.0	36 3	47.6	58.0
86	48.9	51.6	42.5	47.9	50.7	54.5	35.5	46.9	57.5
87	48.3	51.0	41.8	47.3	50.1	53.9	34 8	46.3	57.0
88	47.7	50.5	41.2	46 7	49.6	53.4	34.0	45.7	56.5
89	47.1	49.9	40 5	46.1	49.0	52.9	33.3	45.1	56.1
90	46.5	49.3	39.8	45.5	48.4	52.3	32.5	44.5	55.6
91	45.9	48.8	39.2	44.9	47.8	51.8	31.8	43.8	55.1
92	45.3	48.2	38.5	44.3	47.3	51.3	31.0	43.2	54.6
93	44.7	47.6	37.8	43.7	46.7	50.8	30.3	42.6	54.1
94	44.1	47.1	37.2	43 1	46.1	50.2	29.5	42.0	53 6
95	43.5	46.5	36.5	42.5	45.6	49.7	28.9	41.4	53 1
96	43.0	45.9	35.8	41.9	45.0	49.2	28.0	40.8	52 6
97	42.4	45.4	35.2	41.3	44.4	48 6	27.3	40 1	52.1
98	41.8	44.8	34.5	40.7	43.8	48.1	26.5	39.5	51 6
99	41.2	44.3	33.8	40.1	43.3	47.6	.. .	38.9	56.1
100	40.6	43.7	33.1	39.5	42.7	47.1	. ..	38.3	50.6
101	40.0	43.1	32.5	38.8	42.1	46.5	....	37.7	50.1
102	39.4	42.6	31.8	38.2	41.6	46.0	....	37.1	49.6
103	38.8	42.0	31.1	37.6	41.0	45.5	....	36.4	49.1
104	38.2	41.4	30.5	37.0	40.4	44.9	. ..	35.8	48.6
105	37.6	40.9	29.8	36.4	39.8	44.4	....	35.2	48.2
106	37.0	40.3	29.1	35.8	39.3	43.9	....	34.6	47 7
107	36.4	39.8	28.5	35.2	38.7	43.3	....	34.0	47.2
108	35.8	39.2	27.8	34.6	38.1	42.8	....	33.4	46.7
109	35.2	38.6	27.1	34.0	37.5	42 3	....	32.7	46.2
110	34.6	38.1	26.5	33.4	37.0	41.8	....	32.1	45.7
111	34 0	37.5	....	32.8	36.4	41.2	....	31.5	45.2
112	33.4	36.9	....	32.2	35.8	40.7	...	30.9	44.7
113	32.8	36.4	....	31.6	35.3	40.2	....	30.3	44.2
114	32.3	35.8	....	31.0	34.7	39.6	....	29.7	43.7
115	31.7	35.3	....	31 4	34.1	39.1	....	29.0	43.2
116	31.1	34.7	....	29.8	33.5	38.6	....	28.4	42.7
117	30.5	34.1	....	29.2	32.9	38.0	...	27.8	42.2
118	29.9	33.6	....	28 6	32.4	37.5	....	27.2	41.7
119	29 3	33.0	....	28.0	31.8	37.0	....	26.6	41.2
120	28.7	32.4	....	27.3	31.2	36.5	....	....	40.8
121	28.1	31.9	....	26.7	30.7	35.9	....	....	40.3
122	27.5	31.3	...	....	30.1	35.4	....	....	39.8
123	26.9	30.7	....	....	29.5	34.9	....	....	39.3
124	....	30.2	....	....	28.9	34.3	....	....	38.8

TABLE III.—*Proportions of Stone Expressed in Cubic Feet.*

Voids in Stone per cent.	Proportion of Mortar. 1-1½	1-1¾	1-2	1-2¼	1-2½	1-2¾	1-3	1-3¼	1-3½	1-3¾	1-4
27	5½	6½	7½	8½	9½	10	11	12	13	14	14¾
28	5¾	6¾	7¾	8	9	9¾	10¾	11¾	12¾	13¾	14¾
29	5¾	6	7	7¾	8¼	9¼	10¼	11¼	12	13	13¾
30	5	5¾	6¾	7¼	8¼	9¼	10	10¾	11¾	12¼	13¼
31	5	5¼	6¼	7¼	8	9	9¾	10¼	11¼	12	13
32	4¾	5¼	6¼	7	7¾	8¼	9¼	10	11	11¾	12¼
33	4¼	5¼	6	6¾	7¼	8¼	9	9¾	10¾	10¼	12
34	4¼	5¼	6	6¼	7¼	8	8¾	9¼	10¼	11	11¾
35	4¼	5	5¾	6¼	7¼	7¾	8¼	9¼	10	10¾	11¼
36	4¼	5	5¼	6¼	7	7¾	8	9	9¾	10¼	11
37	4	4¾	5¼	6	6¾	7¼	8	8¾	9¼	10¼	10¾
38	4	4¾	5¼	6	6¼	7¼	8¼	8¾	9¾	10	10¼
39	4	4¼	5	5¾	6¼	7	7¾	8¼	9	9¾	10¼
40	3¾	4¼	5	5¾	6¼	7	7¼	8	8¾	9¼	9¾
41	3¾	4¼	4¾	5¼	6	6¾	7¼	8	8¼	9¼	9¾
42	3¼	4¼	4¾	5¼	6	6¼	7¼	7¾	8¼	9	9¼
43	3¼	4	4¾	5¼	5¾	6¼	7	7¼	8¼	8¾	9¼
44	3¼	4	4¼	5¼	5¾	6¼	6¾	7¼	8	8¼	9
45	3¼	4	4¼	5	5¼	6	6¾	7¼	7¾	8¼	8¾
46	3¼	3¾	4¼	5	5¼	6	6¼	7	7¾	8¼	8¾
47	3¼	3¾	4¼	4¾	5¼	5¾	6¼	7	7¼	8	8¼
48	3¼	3¾	4	4¾	5¼	5¾	6¼	6¾	7¼	7¾	8¼
49	3	3¼	4	4¼	5	5¼	6¼	6¾	7	7¾	8¼
50	3	3¼	4	4¼	5	5¼	6	6¼	7	7¼	8
51	3	3¼	3¾	4¼	5	5¼	6	6¼	6¾	7¼	7¾
52	3	3¼	3¾	4¼	4¾	5¼	5¾	6¼	6¾	7¼	7¾
53	3	3¼	3¾	4¼	4¾	5¼	5¾	6¼	6¾	7	7¼
54	3	3¼	3¾	4¼	4¾	5	5¼	6	6¼	7	7¼

Make one batch of 1½ cubic feet of mortar, 2½ cubic feet of stone; another 1½ cubic feet of mortar, 2½ stone; another 1½ cubic feet of mortar, 2½ stone; and the fourth 1½ cubic feet of mortar, 2½ stone. Since the stone is the same in each sample, with too much mortar the vol-

(*Continued on page* 218.)

THE AMERICAN GAS LIGHT JOURNAL INC.

Entered at the Post Office, New York City, as Second-Class Matter.

Published weekly at 42 Pine Street, New York City.

Telephone Call, John, 2996. Cable, Am-Gas.

E. P. CALLENDER, President.
A. M. CALLENDER, Vice-President and Treasurer.
CHARLES H. WADELTON, Secretary and Manager.

SANFORD K. CAMPBELL, Editor.

Agents—American News Co., 11 Park Place, New York City.
Lemcke & Buechner, Berlin, Germany.
Aug. Siegle, 30 Lime Street, London, England.

TERMS OF SUBSCRIPTION.

United States, Cuba and Mexico, $3 per year. Canada, $4 per year. All other countries, $5 per year.
Single Copies, 10 Cents.

NOTICE TO ADVERTISERS.

New Advertisements and changes of copy therefor should be in hand Wednesday noon of week prior to date of issue.

NEW YORK, MONDAY, OCTOBER 5, 1914.

[Official Notice.]

Transportation Arrangements, American Gas Institute Meeting.

For the convenience of those attending the New York meeting, the Transportation Committee have made arrangements for special train and car service as set forth herein. As only a limited number of cars will be carried it is essential that the railroads be notified well in advance as to the necessary equipment, and it is *important* that those desiring reservations should mail their requests *promptly* to the member of the Committee having charge of the special upon which reservation is requested.

Schedules.—Special Cars.

Chicago Special.—Pennsylvania Lines (Fort Wayne Route), Monday, October 19th; Train No. 8. Leave Chicago (Union Depot, Canal and Adams street), 3:15 P.M.; arrive Pittsburgh, 5:40 A.M. To be attached to special train from Pittsburgh.

Post card requesting reservations should be addressed to Mr. John M. Morehead, Peoples Gas Light & Coke Co., Chicago, Ills.

St. Louis Special.—Vandalia and Pennsylvania Lines, Monday, October 19th; Train No. 26. Leave St. Louis (Union Station), 12:08 P.M.; Terre Haute, 4:52 P.M.; Indianapolis, 6:50 P.M.; Columbus, O., 12:35 A.M.; arrive Pittsburgh, 5:50 A.M. To be attached to special train from Pittsburgh.

Post card requesting reservations should be addressed to Mr. Donald MacArthur, Laclede Gas Light Co., St. Louis, Mo.

Cincinnati Special.—Pennsylvania Lines, Monday, October 19th; Train No. 8-26. Leave Cincinnati (Pearl and Butler streets), 9 P.M.; Columbus, O., 12:35 A.M.; arrive Pittsburgh, 5:50 A.M. To be attached to special train from Pittsburgh.

Post card requesting reservations should be addressed to Mr. J. E. Stacey, Stacey Manufacturing Co., Cincinnati, O.

Detroit-Toledo Special.—Michigan Central and Pennsylvania Lines, Monday, October 19th; Train No. 402. Leave Detroit (Michigan Central Station), 8:20 P.M.; Toledo, 10:35 P.M.; arrive Pittsburgh, 5:50 A.M. To be attached to special train from Pittsburgh.

Post card requesting reservations should be addressed to Mr. J. W. Batten, Detroit City Gas Co., Detroit, Mich.

Philadelphia Special.—Pennsylvania Railroad, Tuesday, October 20th. Leave Philadelphia, 3:36 P.M.; arrive New York, 5:38 P.M. Equipment; parlor cars to be attached to special train on arrival.

Post card requesting parlor car reservations should be addressed to Mr. John B. Klumpp, The U. G. I. Co., Philadelphia, Pa.

Pittsburgh Special.—Pennsylvania Railroad, Tuesday, October 20th. Leave Pittsburgh (Union Station) (Eastern time), 7:05 A.M.; Harrisburg, 1:04 P.M.; North Philadelphia, 3:36 P.M.; arrive New York 5:33 P.M. Special sleepers from Chicago, St. Louis, Detroit-Toledo and Cincinnati will be attached to this train at Pittsburgh.

Post card requesting reservations from Pittsburgh to New York on this train should be addressed to Mr. Joseph F. Guffey, Philadelphia Co., Pittsburgh, Pa.

B. J. Kellum,
Chairman Sub-Committee on Transportation.

BRIEFLY TOLD.

American Gas Institute Convention Arrangements.—The ninth annual meeting of the American Gas Institute will be held in New York, October 20, 21, 22 and 23, 1914. The lecture on the evening of Tuesday, October 20, and all of the regular sessions will be held in the Engineering Building, 29 West 39th street, between Fifth and Sixth avenues. The registration bureau and booths, from which will be distributed and in which can be deposited between sessions, copies of the convention reports and papers, will be on the ground floor, and the office of the Secretary will be on the 8th floor. The arrangements assure ample comfortable space under one roof for all sessions. Bulletin boards will be provided in each meeting place, upon which will be indicated the papers about to be, and being read in each of the four sessions, which will give members an opportunity to select papers in which they are particularly interested.

On Wednesday and Thursday a buffet luncheon will be served at a nominal charge in Room No. 1. This will tend to keep the members together and during the lunches an opportunity will be given for those in attendance to get together and renew old and make new acquaintanceships.

The Hotel Astor has been selected as Convention-headquarters. In the north and east ballrooms, on Wednesday evening, will be held the reception to the present and past Presidents. This will be the principal social function of the convention, and there will be dancing for the guests. Admission will be by ticket only.

The main ballroom in which, on Thursday evening, the annual banquet will be held, is one of the finest banquet halls in America, and the fact that a dinner is provided by Messrs. Muschenheim is a sure guarantee that it will be of the best.

Theatre parties for the ladies will be arranged for Thursday evening, and they are cordially invited to come to the balcony of the banquet hall afterward if they so desire.

For those interested in golf arrangement has been made for the use of the Sleepy Hollow Country Club, at Scarborough-on-the Hudson, which is one of the moet beautiful and exclusive country clubs in the Metropolitan District.

The tentative programme for the three days' session is as follows:

Wednesday, October 21, 10 A.M. to 12:30 P.M.

Institute Meeting—Auditorium.

Report of Board of Directors.
President's Address.
Committee Reports.
Other Institute Business.

Wednesday, October 21, 2 to 5:30 P.M.

Manufacturing Section—Auditorium.

Refractory Materials, by Herman Russell, Chairman.
Oil Tar Separation, Recovery and Disposal, by R. E. Wyant.
Coal Gas Residuals, Feld Process, by F. H. Wagner.
Operating Experiences under a Calorific Standard. Symposium.
Efficiency Relation Existing between Various Test Burners, Argand and Open Flame, by F. H. Gilpin.

Distribution Section—Room No. 2.

The Welding of High Pressure Mains, by J. D. Shattuck.
The Installation and Maintenance of Services, by R. B. Duncan.
The Installation, Repairing and Testing of Meters by a Small Company, by Charles Otten, Jr.
The Improvement of Distribution Employees, by C. E. Reinicker.

Thursday, October 22, 10 A.M. to 12:30 P.M.

Manufacturing Section—Auditorium.

The Year's Progress in Carbonization Methods, by E. L. Spencer, Chairman.
Carbonization in Bulk, Kopper's Ovens, by C. J. Ramsburg.
The Operation of Inclined Retorts, by Frank Huber.

Chemical Section—Room No. 911.

Gas Chemist's Hand Book, by W. H. Fulweiler.
An Electrical Process for Detarring Gas, by F. W. Steere.
A Method for the Determination of Hydrogen Sulphide in Gas, by A. B. Way.
A New Recording Calorimeter by C. H. Stone and W. H. Hinman.

Distribution Section—Room No. 2.

The Proper Specifications for, and Inspection of, Interior Gas Piping, by A. E. Turner.
Piping of Large Buildings for Gas, by O. H. Fogg, Chairman.
Utilization of Gas Appliances, by W. J. Serrill, Chairman.

Accounting Section—Room No. 3.

In Rate Fixing by Commission, Should Depreciation be Deducted from Plant Valuation, by A. C. Humphreys.
Accounting for Depreciation, by Harold Erickson.

THURSDAY, OCTOBER 22, 2 to 5:30 P.M.

Manufacturing Section—Auditorium.

Methods and Facilities for Specifying and Testing Blowers, and Measuring Air and Steam Supply to Water Gas Generators, by J. M. Spitzglass.
Measurement of Gas in Large Volumes, by Dr. J. F. Wing, Chairman.
Purifier Installations, by C. E. Paige.
Care and Maintenance of Gas Holders, by J. H. Braine.

Chemical Section—Room No. 911.

Ammonia Purification, by V. von Starzenski.
The Fusibility of Ash in Coals Used in Gas Making, by Perry Barker.
The Mode of the Decomposition of Coal by Heat, by Dr. H. C. Porter.
Gas Manufacture from the Point of View of Physical Chemistry, by W. F. Rittman.

Illumination Section—Room No. 2.

Illumination by Gas, by C. O. Bond, Chairman.
The Physical Installation of Gas Arcs, by C. A. Luther.

Accounting Section—Room No. 2.

Compensation of Meter Readers, by H. C. Schaper.
Printing and the Care of Printed Stock, by W. P. Baylie.
An Extension of the Dewey Decimal Classification System to Gas Engineering, by D. S. Knauss.
Rate Making, by William McClelland, Chairman.

FRIDAY, OCTOBER 23, 10 A.M. to 12:30 P.M

Institute Meeting—Auditorium.

Unfinished Businesss.

PACIFIC COAST GAS ASSOCIATION CONVENTION.—The 22nd convention of the Pacific Coast Gas Association, at Long Beach, Cal., was a record breaker in respect to attendance and high character of the papers presented, and a great credit to the retiring President, Mr. C. S. Vance. The new officers, named on the last day of the meeting, are as follows:

President—E. C. Jones.
Vice-President—F. A. Cressy, Jr.
Secretary and Treasurer—Henry Bostwick.
Directors—John A. Britton, C. O. G. Miller, W. B. Cline, W. G. Kerckhoff, H. M. Papst, C. B. Babcock and R. J. Thompson.

The task confronting the newly elected officers is stupendous, for next year they will have charge of arrangements for the entertainment of the most important meeting of gas men, the International Gas Congress, with the Pacific Coast Association acting in the role of host. Mr. E. C. Jones, the new President, is now serving his second term in that capacity, having held the office in 1896, three years after the formation of the organization. F. A. Cressy the incoming Vice-President, is one of the live wires of the convention and is well known to gas men of every city on the coast. Henry Bostwick was re-elected to the post of Secretary-Treasurer, owing to his capable handling of that office. He is the private secretary of John A. Britton, Vice-President and General Manager of the Pacific Gas and Electric Companies. The list of directors is the strongest that could have been made, the personnel of the governing body including the prominent men in both the appliance and producing end of the business.

THE WAR AND PUBLIC UTILITIES.—The September number of "Bonds and Mortgages," the Chicago financial monthly, contained an article on "The War and Public Utilities—the Outlook for Investor and Public under New Conditions," by Mr. William H. Hodge, publicity manager, H. M. Byllesby & Co. Mr. Hodge believes that well managed public utilities will withstand the present strain on capital far better than most industries, pointing out, however, that "if a situation arises where a corporation will be saved from serious embarassment by the application of surplus earnings to construction needs, rather than to the payment of dividends, the stockholders would have no ground for criticism. Cases such as this will be comparitively rare in the American public utility field and there is nothing in them warranting lessened confidence on the part of investors in the securities of public utility companies under responsible and capable management."

"Public utilities," he says, "work under the law of averages. They serve large numbers at a small charge per capita. They can go through calamities affecting society just as cities and states persist in the face of blows which wipe out individual and individual enterprises."

ATLANTIC GAS AND ELECTRIC COMPANY FAILURE.—Liabilities of $2,478,212 are given in a voluntary petition in bankruptcy filed in the United States District Court by the Atlantic Gas and Electric Company, of 25 Broad street, New York.

The actual value of the assets is not known, but is estimated at more than $5,000,000, including materials and supplies valued at $20,000, in the possession of the Pennsylvania Utilities Company, of Easton, Pa., one of the bankrupt company's subsidiaries, and bond and note claims against subsidiary companies. The company also holds in its treasury stocks and bonds of subsidiary companies worth $1,143,817, and $460,500 worth of its own stocks and bonds.

The petition states that the bankruptcy action was taken after a meeting of the Board of Directors, at which the step was approved. C. M. Pihl, first vice-president of the company, verified the petition. The company controls the following properties: The Eastern Pennsylvania Power Company of New Jerssy, the Easton Gas Works, the Interurban Gas Company, the Pennsylvania Utilities Company, the Binghamton, Light, Heat and Power Company, the Sayre Electric Company, the Jersey Corporation, the Chemung Land Company.

Of the liabilities $2,420,852 are unsecured. The company owes $550 in salaries and $28,286 to its subsidiaries.

The company has two outstanding bond issues aggregating $3,815,551, secured by a mortgage to the Atlantic Trust Compay of Boston.

Among the stocks and bonds of the subsidiary companies which the parent concern includes in its assets are $2,217,200 of the securities of the Pennsylvania Utilities Company.

The Atlantic Gas and Electric Company was incorporated under the laws of Connecticut on April 2, 1912, for the purpose of acquiring control of established gas and electric properties through the securities of the companies holding them, and to provide through its working capital independent banking facilities for improvements, extensions and betterments for those properties, and to operate them.

The authorized capital stock of the corporation comprises $5,000,000 6 per cent. cumulative preferred and $7,500,000 common. Of these amounts $1,561,900 preferred and $3,361,400 common were outstanding on December 31, 1913. The officers of the company are Arthur D. Lord, President, New York; Carl M. Pihl, Vice-President, Easton, Pa.; F. V. Shannon, Treasurer, and A. B. Cheadle, Secretary.

LIGHTING WEEK, OCTOBER 19–24.—Join the movement for a week's lighting campaign, as outlined by the "Lighting Journal." You know how the "clean-up" campaigns by local advertising has aroused public sentiment for order and cleanliness. Educate the public to a proper conception of the importance of good lighting and they will spend their money understandingly. Lighting companies, fixture dealers and contractors can co-operate in this work, and all be benefitted.

"Occasional advertising in the newspapers is beneficial, but nothing compares with the joint efforts of sharp, direct-to-the point, biting advertising from a number of concerns, advertising simultaneously.

Here are suggestions for an ad:

ARE YOUR CHILDREN RUINING THEIR EYESIGHT BY YOUR NEGLECT IN PROVIDING PROPER LIGHTING?

Again:

ARE YOUR LIGHTING FIXTURES A SOURCE OF PRIDE WHEN VISITORS COME TO CALL?

Hammer away on the lines of the first and you can get a whole town startled and aroused as to their welfare and that of their children. By the second you can prick a woman's pride. She feels it like a jab under the fingernail. Every woman with a home will begin looking around, where before they have not paid any particular attention to lighting fixtures. Get for your lighting business some of the money wasted on bric-a-brac, china and other ware that does not serve any useful purpose.

Say something on store lighting. Tell the people that the store keeper who has the best kind of lighting, has the place where you can depend upon getting reliable goods. This is absolutely within the facts of the case; and bear in mind that the storekeepers where your people buy are the closest readers of advertising. Advertising the merits of modern lighting before the people will do more to wake up the storekeeper to the necessity of having his lighting modernized than personal solicitation. There is nothing like bawling out facts in public—and the newspaper, so far as the people are concerned, is the one place to do it. The manufacturer who already has suitable lighting knows that he is getting more returns for his payroll than if he was handicapped by poor light. He is at a further advantage by knowing that his employees appreciate good lighting as a matter of sight-preservation."

(*Continued from page* 215.)

ume of the concrete will be increased, therefore in progression from the leanest to the richest mixture, that sample which first starts to increase the volume of the concrete has the correct proportions. It may reasonably be stated that aggregates proportioned as described produce a concrete denser and stronger than when not so proportioned.

The Value of Commercial Gas Lighting.

[Prepared for Meeting of Canadian Gas Asssociation by MR. W. KENNEDY.

This is a subject which has interested me greatly during my experience in the gas business, and it is one branch of the business which I believe has not received the interest it merits from gas men in general. I believe that no class of business is more desirable and of more value to the gas interests than the commercial lighting of our cities. Most important of all, I believe, is the advertising value of commercial lighting, as this class of business is always in evidence, and cannot be overlooked. It is before the eyes of the people all the time, and they cannot possibly fail to be impressed. This publicity is of undoubted great value, but its exact worth is hard to estimate.

We know that the mainstay of any business organization is the revenue from the average customer. It is not fair therefore, to conclude that in our business it is the average consumer that we must address to gain publicity. We cannot impress him with our wonderful fuel installations, because he does not see them. Neither can he see our installations of gas ranges and water heaters, but he will, and must see our commercial lighting. If we light a merchant's shop better than he thought possible, is it not fair to presume that we have a good chance of securing the lighting of his home? Besides, most employees are naturally impressed by the judgment of their employers, so that the influence of a well lighted store is far reaching. In my judgment there is no gas appliance that will bring greater returns for the amount of energy and money spent, than the gas arc, for by its use we get the top price for our product. The peak load is not pronounced, nor are the number of complaints any greater than from other lines, and in most cases are less. The expense of handling these complaints is generally covered by a well-organized maintenance service, which is not so for fuel appliance with most companies. The consumption from a gas arc is considered to be equal to that of the average gas range, and is a 12-month consumer, while the average range is not. The average consumption per meter should be much higher in the commercial lighting district than in any other. The efforts necessary to introduce commercial lighting successfully will bring a greater return for the expense than could possibly be obtained from the sale of fuel appliances. It is common for a good salesman to secure an individual order for a large number of lamps, sometimes running into the hundreds. How often does this happen with the gas range or water heater salesman? It sometimes takes as much effort to sell a gas range to a skeptical woman as it does to sell enough arcs to light a factory. The majority of orders taken for arc lamps for store lighting are usually for places where a meter and service are already in, and it is additional consumption. I have seen streets where every store had a meter with practically no consumption except from an occasional stove, coffee urn or hot plate. In these cases the gas company must have been losing money on their overhead charge; where some commercial lighting business would turn them into profitable consumers. There is no excuse for such cases if the commercial lighting interests are given proper attention.

It is always possible to know the status of your commercial lighting, but it is not possible to estimate the condition of any other branch of the business. To explain this, the arc lamps remain on your records, and can easily be referred to, but a gas range, water heater, and almost all fuel appliances are sold direct and nothing more is heard about them. You have no information to show to what extent fuel appliances are used throughout the year.

I have often heard gas men speak of the large number of complaints from the users of lighting appliances. As stated before, this expense is usually covered by a maintenance service, and it is a good thing to know of these complaints, as he who thinks there are no complaints from fuel appliances is badly mistaken; and I believe that every 1,000 feet of gas consumed by lighting appliances causes less complaints than arise from the same consumption by fuel appliances. However, where there is no trouble there is no business. There is no class of business that will show the progressiveness of a gas company to better advantage than the proper lighting of the streets and store-fronts. The greatest per cent. increase in the sale of gas for one year in Toronto was the year we introduced gas arc lamps on the rental plan, and the fact that we sold practically no other appliances is sufficient proof that the increase was caused by the arc lamps. I might explain that orders for 5,000 arc lamps were obtained with the service of three salesmen. Working on the basis outlined above that a gas arc is as good a consumer as the average range, this business could not possibly be obtained by three salesmen selling any fuel appliances. Most of these 5,000 lamps were placed in stores and factories where meters and piping were already in use, requiring no new mains and very few new services or meters.

Until a few years ago the gas arc salesman was compelled to do business with practically one type of lamp, but today we have a lamp for every kind of business, with higher efficiency, better mantles, lower maintenance costs, better and cleaner gas, more uniform pressure, and far more respect in the minds of the public than was shown towards gas companies a few years ago. With these improvements, in my mind the gas companies should push commercial lighting as strong, if not stronger, than any other branch of the business. The business to be obtained in the commercial lighting district is usually the most desirable, because of the character of the people dealt with. Good business is hard to get, but hard to be taken from you. The amount of effort expended to obtain this business makes it more valuable because of the fact that it cannot be taken away from you readily. In Toronto we are just emerging from a period of tremendous electrical agitation, from which the advertising value given to the industry represents millions. Yet, through all this, the level-headed business men have stayed with us and are willing to continue to use gas as long as we can show them that our proposition is a good one. There is a flighty element in every city who flock from one lighting service to another. This business comes easy, but is almost impossible to hold, and is bound to do harm to the lighting business unless it is very carefully handled. We meet this class of business with an iron-bound contract, in which we state that lamps must be kept for one year, and by this means we are able to handle a class of business that we could not otherwise control, as a great many merchants cannot afford to buy lamps, and if they did buy them we might never get the money for them (if sold on the installment plan), so it is better to rent them, as the rental charge is added to the gas bill, for which we get security.

Among other improvements, we have today several new methods of distance lighting which are proving successful. For outdoor lighting, and also for certain kinds of indoor lighting, the mercury valve seems to have the advantage. For high ceilings and fixtures the magnetic control is well adapted. The pneumatic lighter is also a success for certain purposes.

Would the majority of our cities be enjoying the present low price of gas if it were not for the lighting end of the business? I am sure they would not in Toronto. Too many gas companies expect their consumers to light with gas without offering them the latest gas-lighting appliances. This is a serious mistake, as the live merchant thrives by selling goods that change in style every year, and in some lines more frequently than that. Their windows are rebuilt; advertising methods are changed; delivery service improved; employees' conditions made better; working hours made shorter; higher wages paid. When they make these changes, should we expect them to tolerate antiquated gas-lighting fixtures?

To illustrate my statement that the gas lamps should be kept up-to-date, and to show that gas companies can make money and do this, I give you the following figures: The average gas arc lamp does not cost more than $8. To this add a charge for maintenance of 30 cents per month. These lamps will last 4 years or longer, but let us assume that they are obsolete at the end of this period. We have now spent $22.40; and on a rental basis of 50 cents per month, would receive $24, leaving $1.60, which would go a long way toward paying for the installation. Our customer has had an up to-date lighting installation at a reasonable figure, and we have recovered our investment and are now ready to introduce a more modern appliance. Of course, you cannot expect lamps to last 4 years if they are not properly taken care of, especially out-door lamps. I have seen instances where it was proved that lamps will last a great deal longer, sometimes indefinitely, if properly taken care of. One case I will relate: Five years ago, in front of a cigar store in Toronto, three arc lamps were installed. They were sold outright, and no provision was made for maintenance, except a call service, for which a charge was made

of 15 cents per mantle used, without charge for labor. After being in use 3 years the bodies of all these lamps completely rusted away from their supports and were held in position only by the globes. At the same time, other lamps of the same type were installed throughout the city on the rental basis, where they received a weekly maintenance service and were taken down and replaced by other lamps when renovation was necessary. All of these latter lamps are to-day practically as good as new. Of course, we have spent money for repairs and labor, but they are as good as the day they were bought.

We will continue to do this with these lamps as long as the demand for them keeps up. I previously stated that I did not believe in making customers keep lamps after they have become obsolete, and we are not doing it. The lamps I referred to are of the upright type, and as soon as the inverted type was perfected we stopped buying the upright, and reduced the maintenance rate on them from 75 to 60 cents per month, the rental for the inverted being 75 cents. This gives the customer an opportunity to secure a lamp at a lower maintenance charge, and enables us to keep the lamps in use. The same idea is carried out all the way through our rental system; when new lamps are introduced the old ones are reduced in price.

I believe the manufacturers of lighting appliances are doing their share, but do we give them sufficient encouragement? I have been told by appliance manufacturers that they are frequently asked to take worn-out appliances in exchange for new ones, allowing in some cases as high as 20 per cent. of their original value. Gas companies do not care to take back gas stoves from their customers after they have become obsolete, and when they do the customer usually pays as much for the new stove as if he had made a straight purchase. In Toronto, we make it a rule never to take back anything that has been sold, provided it does what we claim for it, and we have very little trouble in this respect.

It is not generally known that several years ago the express companies made it a rule to use gas for lighting purposes wherever possible, because of its high quality as a lighting medium. This decision was reached after certain statistics had been taken which proved conclusively that less mistakes were made with the use of a gas light than with any other kind of light.

Gas companies cannot be too careful to see that lamps receive proper attention from their maintenance departments. The weak points in the organization are bound to show themselves first in this branch. To maintain a lamp well, also means to maintain it at the lowest cost, and we find that commercial lamps maintained weekly cost no more than those maintained monthly.

We hear a great deal these days about large fuel installations, but we do not hear so much about the price they get for the gas from this kind of business, nor do we hear when these customers are lost to oil or producer gas competition. Combination companies, as a rule, do not favor gas for lighting purposes, and I could never understand the reason. A perusal of the volume of business of a number of the large gas companies is, in my judgment, sufficient to convince anyone that it is beyond comparison with that of the combination companies. A gas man in one of our prominent cities, and connected with a combination company, recently told me that they regretted very much that they had not advocated gas lighting, as they have since lost their electrical franchise and now have very keen competition in electric lighting. In the period of one year they lost 75 per cent. of their electrical business. For combination companies to neglect the gas lighting business is a discrimination against their customers, as it forces them to buy inferior lighting fixtures when they should receive protection. A denial of this protection and service surely breeds dissatisfaction, which is the most serious thing a public service corporation has to contend with.

For years we have had laws regulating the standard of the quality of gas supplied, about which, of late, we have had a great deal of agitation on the part of certain gas interests to change these standards from a candle-power to a B. T. U. basis. A few cities on this continent have by-laws regulating the maximum and minimum pressures at which gas is to be delivered. An extension of these laws applying to the sizes of piping used and the manner in which it is installed is, in my judgment, of equal importance. The observance of such a law would almost entirely eliminate complaints caused by the condition of interior piping, and would dispel the vague ideas which are taken as the causes for various complaints, placing the fault with the gas companies. The electrical interests have welcomed the establishing of by-laws governing wiring, and in a great many instances have supported movements to bring about such laws.

Killing the Burning Gas Well in the Caddo (La.) Oil Field.

This is an account of the way in which the Conservation Commission brought a burning well under control, by drilling a relief well to the stratum from which the gas was blowing and forcing water into the gas sand.

The well is in the SE. ¼ of the NE. ¼ of the SW. ¼ of Section 7, T. 20 N., R. 15 W., on a 10-acre tract owned by B. G. Dawes, Trustee. Work on the well was started on March 17, 1908, and on May 11 the drilers had reached a depth of 2,065 feet. The well was cased off with 300 feet of 10-inch casing pipe and 900 feet of 8¼-inch, the 6-inch casing pipe was not set. During the day (May 11) the well began to give trouble and blew out from the 1,800 foot gas stratum (Sub-Clarksville sand). The drilling mud was made as heavy as possible and the driller started to pull the 4 inch drill pipe out of the hole to change the bit. In the night, during a heavy rain, while the 4 inch drill pipe was being put back and was about 350 feet from the bottom, the well blew the drilling mud out again with much more violence than before. The gas pressure raised the drill pipe up, which unlatched the elevators and the drill pipe dropped 350 feet in the hole. The well continued to blow out, increasing all the time in volume, which was estimated the next day at 40,000,000 cubic feet in 24 hours, and also made a strong salt-water flow. The owners of the well did everything in their power to get the well under control. A lubricator was made of two pieces of 8¼ inch pipe and screwed on the 8¼-inch casing to kill the well, but as soon as the valves were closed the gas broke the seats of the 8¼-inch and 10-inch casings and began to blow out under the derrick floor. The valves on the lubricator had to be opened to release the pressure from the casing, but the flow of gas around the 8¼-inch casing had relieved the pressure of the drilling mud on the 800 foot gas, which now started to blow out between the 10-inch and the 8¼-inch casings.

Note.—A well is killed with a lubricator in the following way: Two lengths of pipe, with gate valves at the top and bottom, are screwed on the casing of the well, the lower valve is closed and the two pieces of pipe filled with heavy mud. Then the upper valve is closed and the lower valve opened. The pressure in the well and in the lubricator becomes equal and the mud drops through the lower valve into the well. The lower is closed and the upper valve opened again and the operation is repeated until the bore hole is filled to the top with heavy mud and the blowout stopped.

On the evening of May 13 a cyclone completely destroyed the derrick and drilling rig. A deep hole was then dug around the 10-inch casing, with the well open, flowing gas and salt water, with the object of putting a cement block around it, which might hold the gas back long enough to lubricate the well. At 20 feet from the top a split was found in the 10 inch casing pipe. After several days the drillers succeeded in getting a joint of 14 inch pipe over the 10-inch pipe and the two were cemented together, and a big block of solid cement was placed around the casing. The cement was allowed several days to harden, while the well was blowing gas and salt water. Then a second attempt was made to lubricate, but the pressure was so strong that the gas escaped outside the 10-inch casing into the shallow-water sand, which is found at about 75 feet in that part of the field, and blew out on the ground about 300 feet from the well. The well had to be opened up again and all the material brought in safely and a last attempt made to kill the blowout. But the gas continued to escape around the well, coming closer and closer to the hole. The owners then abandoned it, considering it impossible to get it under control. In less than 3 weeks the escaping gas and water formed a crater around the well at least 100 feet in diameter, which became larger and deeper as time passed.

In June, 1908, the well was put on fire because the gas was a continuous danger to those who had to work and live in the surrounding woods. The well stopped burning in February, 1909, but caught fire again soon afterward, and was allowed to run wild until the summer of 1913. Most of the time the gas was burning, but heavy rainstorms and wind sometimes put it out, and after a few days the gas would catch fire again. The muddy waves caused by the escaping gas kept on washing more and more material in the hole increasing the size and depth of the crater, until finally it formed a circular pool 225 feet in diametor, in the center of which the escaping gas threw up a body of mud 25 or 30 feet high.

The volume of the gas escaping from the well at the end of its life was estimated by experts to be between 8,000,000 and 10,000,000 feet per day. Not only was this waste of gas deplorable, the value at 2½ c. per 1,000 cubic feet amounting to about $250 per day, but it

affected the rock pressure of the surrounding territory, which had fallen below 100 pounds to the inch. and allowed the salt water to enter the gas formation.

When the Conservation Commission took the matter in hand it was decided to first empty the pool which the blowout had made, to find out the condition of the casings. It took about 20 days to empty the crater. (Fig. 1.) The bottom of the pool sloped from the border for

Fig. 1.—View of the Crater of Burning Well after being Pumped.

about 50 feet until it reached a depth of 10 feet below the surface. From there the crater was conical, with a diameter of about 125 feet, sloping down to the bore hole, where it had a depth of from 37 to 40 feet. The top of the 10-inch and the 8¼-inch casings could be seen in the bottom of the crater. The well was not blowing outside the 10-inch casing pipe, evidently after the pressure of the well had gone down, the caving mud had fallen in around it so that the water and gas could only escape between the casings. It was observed that the well blew out cold salt water, which showed from what depth the blowout was coming, because the salt water found in the deep sand rocks is warm.

The tops of both casings were worn very thin and it was impossible to screw any connections on to them. The original plan was to set a disk wall packer inside the 8¼-inch casing on 4-inch pipe about 100 feet from the top and let the well blow through the 4 inch pipe, then pack the space between the 8¼-inch and the 10-inch casings with a stuffing-box casing head and make a cement block outside the 10 inch casing, after which the well perhaps could be closed in. But the condition of the top of the casings would not allow this scheme to be carried out. Then it was decided to drill a "relief well," as close to the old hole as possible and to try to stop the flow of gas and water by pumping water or mud into the gas formation.

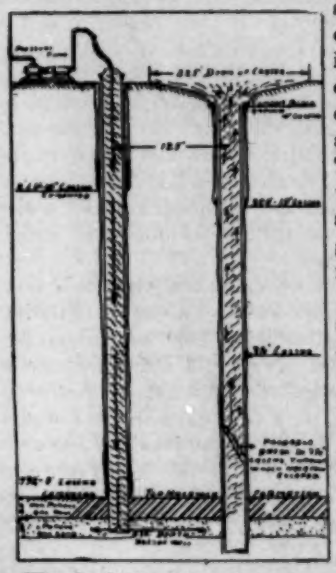


Fig. 2.—Section through Burning Well and Relief Well.

This relief well was drilled on the southeastern side of the crater, at a distance of 125 feet from the center. (Fig. 2.) The hole was cased off with 211 feet of 10-inch casing and 792 feet of 8-inch casing pipe, both cemented. The 8-inch casing pipe was set on the top of the Nacatoch sand. The cement was allowed to harden for 9 days, after which the seat of the 8-inch casing was tested. Mr. Smith ordered the well to be drilled with clear water 20 feet in the Nacatoch formation. The rock encountered in this 20 feet was not porous enough, in the judgment of Mr. Smith, to attempt to pump in water. The well was then drilled 20 feet deeper in the same formation, the total depth being 832 feet.

The formation in this last 20 feet was considerably more porous than the first 20 feet below the 8 inch casing, and it was decided to make the experiment at this depth. A reservoir covering 3 acres ranging in depth from 6 inches to 3 feet, was filled with water, and the 8-inch casing connected to a pump and the full pressure put on the formation. The pump was an ordinary 10 by 6 by 12-inch rotary drilling pump; the boiler pressure was 120 pounds per inch and the pressure delivered by the pump was 310 pounds per inch. After the hole was filled, the pump ran at about 5 revolutions per minute for an hour, forcing about 29 gallons per minute into the gas formation. During the next 5 hours the revolutions increased slowly from 5 to 10 per minute, the gauge registering the same pressure. During the following days full pump pressure was kept continually on the well, and the revolutions increasing gradually, the pressure against which the pump had to work decreasing. After the fifth day the pressure registered was about 150 pounds, and the revolutions 30 per minute, equivalent to a volume of 165 gallons being forced into the gas sand each minute. On the seventh day the pressure was 50 pounds, the pump running 42 revolutions per minute. It was noticed that the pressure would fall considerably for a short time and then run up again, which could only be explained by assuming that the water opened up a new channel in the formation, relieving the pressure, and when the cavity was filled the pressure went up again to what it had been before. On the seventh day a slow decrease in the strength of the eruptions was noticeable, and on the tenth day the eruptions ceased, and the salt water and mud in the pool flowed back in the old bore hole, leaving the craker empty. Although no gas escaped from the hole, the pumping was continued for three more days, to drive the gas still further back in the formation and away from the well. The space between the 8¼ inch and the 10 inch casings was then filled with cement and a heavy cement block was put around the 10-inch casing. Then blasts of dynamite were fired around the circumference of the crater about 10 feet apart causing several tons of shale and clay to fall to the bottom. If the well should start to flow gas and salt water again, the water will mix with the shale and clay and make a thick mud, which would kill the well.

A low estimate of the production of the well during the 5 years that it ran wild at 15,000,000 cubic feet per day, or the volume of natural gas which escaped into the atmosphere during this time 27,000,000,000 cubic feet. At 2½ c. per 1,000, this represents $675,000.

In Shreveport the industrial selling rate for gas is 7.7 c. per 1,000 cubic feet. If all the gas which went to waste had been sold for manufacturing purposes only, it would have brought $2,079,000.

At the time the well was killed the eruptions were still very violent and during the last year no decrease in their strength had been noticeable. No doubt it would have been several years before the burning well would have died naturally. It is impossible to estimate the value of the gas saved by the energy and activity of the Conservation Commission, but it must amount to several hundred thousand dollars. The cost of drilling the "relief well" and putting out the burning well was approximately $6,000, which is a very small amount compared with the value of the gas saved.

British Gas Companies on the Continent.

By an English Contributor.

Much interest is being aroused here in connection with the position of gas companies on the European Continent in which British capital is largely interested. Three of these companies which have interests in the belligerent countries are the Imperial Continental Gas Association, the Continental Union Gas Company, and the European Gas Company. The largest of these three companies, the Imperial, has works in several places in the area in which military operations have been taking place, and some of the shareholders have been fearing for the safety of their property. In the case of gas works, however, it is often quite as much to the interest of the one side as the other of the fighting forces not to damage this property, because the invader as much as, if not more than, the defendant requires light. The position of an invader in a hostile city of darkness might be one full of danger. A gas holder is a good mark for artilliary if it were desired to damage such property, but at the same time the prominence of these holders shows the spot to be avoided if it is the wish to preserve the lighting of a town.

The Imperial Continental Gas Association directly operates gas works in Antwerp, Berlin, Bruex, Brussels (suburbs of), Flushing, Graslitz, Hanover, Komotau, Prague and Saaz. In France, through the Compagnie Continentale du Gaz, of which it holds the whole capital, the Association owns gas works at Argenton (Indre), Armentieres (Nord), Cholet (Maine et Loire), Corbeil-Essonnes (Seine et Oise), Estaires (Nord), Evreux (Eure), Lille (Nord), Meaux (Seine et Marne), Morez (Jura), Mouy (Oise), Nonancourt (Eure), Romilly-sur-Seine (Aube), Saintes (Charente Inferieure), St. Jean d'Angely (Chal rente Inferieure), Thizy (Rhone), and Uzes (Gard).

In Frankfort on-Main also the Association is interested as the holder of 57 per cent. of the capital of the Frankfurter Gas Gesellschaft, the balance of the capital of that local company being held as to 23 per cent. by the municipality and 20 per cent. by private individuals.

With interests in such a wide area, where fighting has already taken place, or may take place in the future, it is obviously impossible to say at the present junction what will be the full effect of the war on the fortunes of the company, but at the same time there is no cause for shareholders to become panic-stricken, as I hear some are inclined to be, or even to be very despondent. The company is in a strong financial position, while I gather at the company's offices that reports so far to hand show that no damage has been done to the company's properties. Communication direct from Berlin is cut off, but indirectly it has been reported that the German Government has taken over the company's property in that city. This may be regarded more as a safeguard for the company than otherwise. The undertaking in Berlin is popularly known as the English Company, and in the present state of opinion in Germany it would not have been surprising if the public had attempted to damage the property. With the Government in charge, however, this danger is avoided, although of course, the company may suffer a temporary loss of revenue from that center. The ultimate attitude of the German Government to wards English companies must depend upon the result of the war and, of course, it is the hope of the Allies that the Berlin authorities will not be in a position to have much option in this matter.

Communication is being kept up with Antwerp, and a report received within the past few days shows that the gas works are intact and working. With Brussels communication is difficult, but news received since the German occupation shows that the gas works are undamaged and that sales of gas and coke are continuing. As regards the French towns in which the company is interested, no damage to gas property has been reported, and the only place where work has ceased is at Meaux, where just before the German occupation the Mayor advised that the works should be shut down, and this course was adopted.

In connection with the suggestions which have been made for the seizure and confiscation of German property in this country, the question of retaliation on the part of Germany must not be overlooked, and the matter has been particularly pointed out to us in connection with these English companies owning gas works on the Continent. The Imperial Company, for instance, has a capital of over $30,000,000 employed in gas works on the Continent, and a large proportion is in Germany. Should the German Government confiscate or damage this property as a retaliatory measure, a large number of English investors would be affected. The English shareholders number some 7,000, while the foreign holders are less than 200, including French and Belgians. These English investors hold 97 per cent. of the capital of the company, so that the undertaking is thoroughly British.

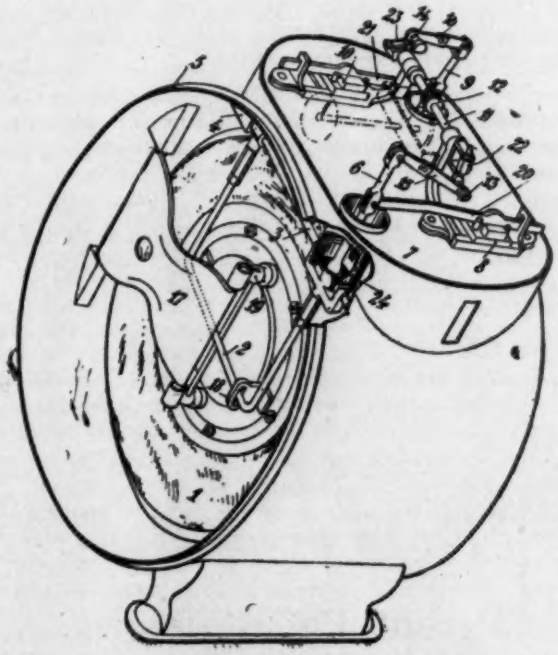
The Continental Union Gas Company is a holding concern and does not operate any gas works directly on its own account. It derives its income from its holding in the Compagnie l'Union des Gaz, interests in other companies, loans, etc. The works of the companies in which the English company is interested are principally in Italy, along the Mediterranean, and in the more southern towns of France, which are considerable distances removed from the present sphere of fighting. The only works near the scene of present operations in which the company is concerned are situated in the west of Paris and in Strasburg. At the latter place, during the Franco-Prussian war in 1870, the gas works, which belonged to Compagnie l'Union des Gaz, were destroyed in the bombardment by the Prussians, but compensation was subsequently forthcoming, the work were rebuilt, and the French Company has continued in ownership since then. The works in the west of Paris were also in existence during the siege of Paris in the Franco-Prussian war, but they suffered no damage. At all the works in which the English company is interested there are large stocks of coal, it having always been recognized that this was necessary in case there should be interruptions in supplies owing to strikes or some other cause. Notwithstanding disorganization in the French coal fields, therefore, these works will be able to steadily continue operations, and the English company is therefore not likely to suffer to any material extent as a result of the war.

The European Gas Company operates gas works in Amiens, Bolbec, Boulogne, Caen, Havre, Nantes and Rouen. Although not far removed from it, the majority of these places have been outside the actual fighting area. As regards Amiens, the only one of these towns through which the German army advanced, reports to hand show that no damage has been done to the gas works. At the other places operations are proceeding as usual.

New Methods and Appliances.

A New French Meter.—French patents have been issued on a meter thus described: The reciprocating movement of each diaphragm is transmitted to the recording mechanism by means of a stirrup, 2, which alternately swings from front to back and turns about its horizontal arm, 3. The stirrup transmits an opposite reciprocating motion to the upper extension of the rod, 6, which operates one of the slide valves, 8, and the recording mechanism of the meter. The driving gear of the two bellows is symmetrically arranged in such a way that the second rod, 9, drives the second slide valve, 10, and simultaneously acts on the recording mechanism through the intermediary of the common spindle, 11, and screw, 12, on the spindle. The spindle is rotated in one direction by means of crank pins, 13, 14, and rods, 15, 16, which connect the crank pins with the outer pivots of the rods, 6 and 9.

The inner arm of the stirrup, 2, is connected to the bellows by lugs, 18, provided with slots and arranged on either end of the



stirrup, 2, and perpendicularly to the pi vots, 19, of the guide, 17. The stirrup, 2, thus serves, together with the guide, 17, to retain the diaphragm so as to move always parallel to itself. It is thus obvious that under these conditions it suffices to fasten the bar, 20 or 21, of each slide valve at a convenient point of the driving rod, 6 or 9, in or der to obtain the desired displacement of the slide valve on its seat.

One of the essential features of the invention consists in that on each of the driving rods, 6, 9, there is, at the centre of oscillation, where the rod traverses the wall between the slide valves and the bellows, a diaphragm, 24, of leather or other air-tight and flexible material, and fixed air-tight on the rods and on the wall, 7. Thus the metal cut out for the passage of the rod is replaced by a diaphragm so no gas can pass. Because of the small amplitude of oscillation the diaphragm, 24, need be only slightly bent in order to follow the movements of the rod.

Publications.

[All Publications, Catalogues, etc., mentioned below, are kept in our office for the convenience of our patrons.]

The Hygienic Value of Gas Lighting, by R. Ff. Pierce.—Published by the Welsbach Company, Gloucester, N. J. This little booklet contains 22 pages and as the title implies is devoted to the study of the Hygienic Value of Gas Lighting, treating the subject of gas lighting as an interior illuminant. The booklet contains abstracts of reports on experiments and tests; also an abstract of the exhaustive experiments of Dr. Rideal, comparing the results obtained in tests with gas and electric lights.

The Lloyd Gas Valve.—Catalogue No. 800.—Lloyd Construction Company, Detroit, Mich., containing 50 pages, illustrating and describing the construction of various types of Lloyd valves.

Nonpareil Cork Covering for Cold Pipes.—The Armstrong Cork Company, Pittsburgh, Pa. This booklet contains 63 pages, describing the use of Nonpareil covering and lagging for brine and ammonia lines, ice water lines, tanks and coolers. Several pages are devoted to tables and tests pertaining to the use of the covering. A number of plants are illustrated where Nonpareil covering is being used and a description given of them.

Gas News.—Published monthly by the Consolidated Gas and Electric Co., Baltimore, Md. Vol. 2, No. 8, August, 1914, gives description of various installations of Gas Engines, Industrial Appliances, Confectioners' and Bakers' Gas-fired Equipments.

Vulcan Bulletin.—Published monthly by the Wm. M. Crane Co., New York. Vol. 2, No. 12, August, 1914. A timely suggestion is given in this number on heating stoves, with a description of the Vulcan Reflector Heater.

Recording Pressure Gauges.—Bulletin 188, the Bristol Company, Waterbury, Conn. This bulletin contains descriptions and illustrations of Bristols Recording Differential Pressure Gauges. Bulletin 189 is descriptions and illustrations of Bristol Patent Float Type Recording Differential Pressure Gauges.

Gas Pumps, Boosters and Exhausters.—Bulletin 13-A. The Connersville Blower Co., Connersville, Ind. The bulletin contains several tables and illustrations and description of coupling up blower direct with motor.

Suspended Concrete Bins.—Catalogue S, 1914, Brown Hoisting Machinery Co., Cleveland, O. This catalogue contains information on the construction of suspended concrete bins; discription is given of the method of construction and varied applications of the bins are shown.

Overhead Hand Traveling Cranes.—Catalogue P, 1914, Brown Hoisting Machinery Co., Cleveland, O. As noted in the title, the catalogue contains data on traveling cranes and varied applications of the apparatus.

Eclipse Rays.—The last number of the bulletin of the Eclipse Stove Company is particularly good. The gas table-set shown is a real step in competing with electricity, and a means of utilizing the newly developed dining-room dome with independent outlet.

Recent Patent Issues.

Prepared for the American Gas Light Journal by Royal E. Burnham, solicitor of patents and counselor in patent causes, 833 Bond Building, Washington, D. C., from whom illustrations and specifications of any patent mentioned below may be obtained for 20 cents.

1,110,782. Process of Producing Gas. J. H. Hirt, El Paso, Tex., assignor, by mesne assignments, to Allis-Chalmers Mfg. Co.

1,110,867. Gas Furnace. B. C. Bartlebaugh, Wheeling, W. Va.

1,110,991. Process of Regulating the Temperature of Combustion. J. M. Rusby and J. H. Taussig, Philadelphia, Pa., assignors to The United Gas Improvement Co., same place.

1,111,140. Gas Generating System. U. H. Deering, Cleburne, Tex.

1,111,148. Water Heating Appliance for Gas Stoves. C. H. Giese, Newark, N. J.

1,111,618. Lockable Cock for Gas Meters. E. A. C. Schoof, New York city.

Items of Interest
FROM VARIOUS LOCALITIES.

The Gardner (Mass.) Gas, Fuel and Light Company are answering the local demand for better street lighting by entering actively into the competition to supply an ornamental lighting system. They have set up several posts on Central street to demonstrate the advantages of gas illumination.

President Hullswith and Secretary Schadalee of the United Light and Railway Company, of Detroit, Mich., have been inspecting the progress of the improvements at the electric and gas plants in Mason City, Ia., and state that they shall complete the improvements planned.

The Central California Gas Company, of Visalia, has made announcement of a further reduction in gas rates to take effect October 1st. This is the fourth reduction since the present company took over the business, a little over a year and a half ago. Though the reductions have all been comparitively small, the policy of the company is to keep lowering the rates in proportion to the increase in the volume of business. The company serves Visalia, Exeter, Lindsay, Porterville, Tulare and patrons along the lines to these cities. The present reduction is 5 cents on the second thousand feet, or $1.25 net; 5 cents on the third, or $1.15 net; 10 cents on the fourth, or $1, and a reduction of 15 cents on the fifth thousand, or 85 cents net. Under the last rate, 3,000 feet costs the consumer $4, and will cost under the new schedule $3,90. This saving of 10 cents per month for the average consumer will mean a saving of over $2,500 year to the consumers. Since January 1, 1913, the company has spent for improvements $181,827.50 and sold over $28,000 in stoves and appliances.

Minneapolis, Minn., may legally purchase and operate a gas plant in the opinion of City Attorney Gould given at a late meeting of the special council committee. The city attorney said the Mueller law for the purchase and operation of public utilities is valid. It is only under this law the ordinance for the acquisition of the Minneapolis Gas Light Company plant could be effective. With his opinion, Mr. Gould advises the committee to recommend separate elections on the questions of purchasing the plant and the issuance of bonds, should it see fit to recommend the ordinance itself.

The Holland City (Mich.) Gas Company has elected directors and officers as follows: Directors, Joseph H. Brewer, Charles B. Kelsey, W. J. Ripley, Blaine Gavett, Charles McPherson; President. Joseph H. Brewer; Vice-President, Charles B. Kelsey; Secretary, Blaine Gavett; Treasurer, W. J. Ripley.

The Southern Illinois Light and Power Co., is enlarging its gas plant at Hillsboro. Two new storage tanks are being added at an investment of about $1,800, and have a capacity of 25,000 cubic feet each. The increase is due to the extraordinary demand. There are now over 300 consumers, although the service was started only January 15. F. P. Reynolds, the manager of the gas department, is getting new consumers all the time.

T. J. Condon, Superintendent of the Cairo (Ills.) City Gas Company, has resigned his position to go to Amarillo, Tex., as Superintendent of the gas company at that place. Mr. Condon has been with the McKinley system for about 11 years. He came to Cairo from Galesburg, Ills., about four years ago as foreman, but shortly after was promoted to the superintendency. Since he has been superintendent he has installed a new water gas machine and put in about 3 miles of mains. His first work at Amarillo will be to install a 5 foot water gas machine. Mr. Condon is going to a very live place. In 1900 the population was 1,200, and in 1910 it was 12,000, and it is still growing.

In view of the postponement of the the International balloon race for the James Gordon Bennett Cup, which had been scheduled for October 15, but was called off because the foreign pilots could not compete, an American race is being arranged. A. Leo Stevens is organizing the event, and it will be run under the sanction of the Aero Club of America. From 6 to 10 entries are already assured, and upon the number of contestants will depend the point from which the start will be made. At first Pittsfield, Mass., was selected, and if the Pittsfield Gas Company is able to supply gas the start will probably

be made there. If not, the alternative is Point Breeze, Philadelphia. The tentative date is October 7.

THE Ocala (Fla.) Gas Company, will immediately begin to put its new building in shape. Since the practical destruction of the plant by fire several months ago, the company has merely had a makeshift shed over the machinery. Now it will put up a new building, which has arrived on flat cars, is of galvanized iron in section all ready to be put up and bolted together. It is probably the first building of its kind to be built in Ocala.

THIS from a Worcester, Mass., paper: To many residents of New England the fuel problem has come to be a pressing one because of the increase in freight charges on hard coal. Domestic coke, a by-product from the manufacture of illuminating gas, which the Worcester Gas Light Co., is selling in quantities in Worcester, offers a good substitute and has become a factor with families who do not feel able to stand the expense of coal. Last year they sold 13,000 tons of coke in Worcester. The company has just completed a new coke handling plant in connection with its new coal gas plant. This, taken with its fleet of motor trucks makes it possible for the company to give the best service in the way of quality and delivery. Furnace coke at $6 a ton is a decided saving over any other fuel for heating. Printed instructions on how to use coke are given by the company, and a demonstrator is sent to give a free demonstration if requested, showing how coke can be used in cooking stoves, heaters or furnaces.

THE Municipal Gas and Electric Department of Springfield, Mass., will not place gas meters in cellars, halls or corridors or in any other places free to public access hereafter, unless the owner of the building is willing to assume all risks. In auditing the accounts of the department it has been found that the department lost $700 during the past year by reason of gas meter robberies, while the loss in meters is nearly three times that amount.

UPON application of the Pintsch Compressing Company, of New Jersey, Judge John R. Hazel in the United States District Court has appointed Dr. Alexander C. Humphreys, of New York, and Harry T. Ramsdell, of Buffalo, receivers of the Buffalo Gas Company under bonds of $50,000 each. The company is capitalized at $9,000,000. Failure to pay interest on bonds was claimed in the application for the receivership.

THE New Bedford (Mass.) Gas and Edison Light Company have moved into their new office building. The informal opening was on the 29th ult.

L. H. BURNETT, of Aberdeen, has made application to the Chehalis City, Wash., Commission for a gas franchise. It is proposed to use either natural or manufactured gas, but Mr. Burnett is positive in his assurance that his company is in no way connected with any of the various oil companies that are claiming that gas is about to be discovered in paying quantities as a means of selling stock.

CONDITIONS prevailing during August as the result of the war do not appear to have unfavorably affected the earnings of the utility properties under the management of H. M. Byllesby & Co., these companies showing combined gains at a considerable higher ratio than for the entire year to September 1. For August the combined earnings were as follows:

	1914.	Increase.
Gross earnings	$1,071,461	$46,986
Net earnings	488,738	45,957
For the 8 months:		
Gross earnings	$9,399,991	$153,231
Net earnings	4,229,146	211,647

These properties include the subsidiary companies of Standard Gas and Electric Company, Northern States Power Company of Minnesota and Western States Gas and Electric Company, located in 16 of the mid Western, Pacific and Southern states.

THE Common Council, of Troy, N. Y., has referred to the Lamp Committee an ordinance authorizing Mayor Burns to rescind the present contract with the Troy Gas Company for municipal lighting and the Board of Contract and Supply to advertise for bids and enter into a new contract for a period of five years, which will include an ornamental lighting system. The adoption of the ordinance would mean practically the acceptance of a proposition made by the gas company as explained in detail in a communication sent to the Aldermen.

"R. G. H.," WRITING from Rome, Ga., says: The gas company has commenced to dismantle their largest gas holder, preparatory to installing a new one. The new holder will be capable of throwing a greater pressure on the mains than has been the case heretofore. The work of rebuilding will be done by the Stacey Company, of Cincinnati. It will be a matter requiring both skill and care to maintain an unvarying supply of gas to the city while the work is being done, but those in charge are confident of carrying it through with a minimum of inconvenience to the public. After the work is com pleted a general improvement may be looked for.

THE St. Albans (Vt.) Gas Company lost between 5,000 and 6,000 cubic feet of gas Sunday evening as a result of some boys going into the gas plant on Laselle street and opening a valve in one of the tanks.

MESSRS. S. P. CURTIS and H. M. Blake, of Philadelphia, officials of the American Gas Co., which controls the Luzerne County Gas and Electric Co., have been in Wilkesbarre, Pa, looking over the property of the local company.

LITIGATION of importance to consumers of gas in Minneapolis, Minn., has been begun, the court having been asked to determine whether the Minneapolis Gas Company is compelled, under the present ordinance, to pay the cost of laying service pipes from street mains to houses. The company maintains it is under no legal obligation to do so. The company has filed suit against the board of education to collect $71.59 charges for laying service pipes to 10 school buildings. The board of education has refused to pay the charges, asserting under the regulatory ordinance of 1910, the gas company is obliged to furnish service pipe connections to buildings, upon demand and without cost to the property owner, when the main is in the street.

PREPARATIONS have been made to start grading, exca vations, etc., on the site for the by-product ovens at Chattanooga, Tenn. In charge of the construction work, which will start at once, will be M. W. Dittoe of Chicago, and Arthur Roberts, the inventor of the Roberts ovens, the kind which will be installed in the plant. A decision has not been made as yet whether the breaking of the ground for the foundations will be made a ceremoniou occasion or not, although it is though that officials of the Chamber of Commerce and others who have been connected with the proposition would like to have it so, as it marks the fruition of some mighty hard work on their part and they would like to enjoy the results. President Wo lle is under the impression that the work had better speak for itself and the decision will be left entirely in his hands.

THE Suffolk County, N. Y., supervisors have agreed to the plea of the Patchogue Gas Company to compromise its taxes by paying 50 cents on the dollar and start this year with a clean slate. The company has paid no taxes for 10 years, but now pays about $3,000 and starts afresh. The balance owing, $2,529.26, is to be charged back to the town of Brookhaven as a returned tax. The company stated that, although there was a serious question as to whether or not its taxes had been illegally assessed, it was willing to pay 50 cents on the dollar to effect a settlement.

THE City Council of Salem, Mass., has voted to ask the Salem Gas Light Company to reduce the price of gas from $1.10 to 75 cents per 1,000 cubic feef.

VOTERS of the town of South Hadley, Mass., refused to rescind the action taken last April when it voted down the article to see if the town would rescind the action taken by which the Board of Selectmen was empowered to petition the Legislature for the annulment of the then existing franchise of the Springfield Gas Company and grant it a new one.

A LONDON dispatch says a German Zeppelin made a bomb-dropping tour during the night, visiting several Belgian cities. At Dynze, a man 82 years of age was injured mortally. He happened to be in the vicinity of a hospital, upon the roof of which a bomb struck, doing considerable damage to the building. Another bomb, dropped at Rolleghem, did no damage. Retiring by way of Thielt the Zeppelin dropped 2 bombs upon the gas works there, causing considerable damage. The airship then proceeded by way of Courtral in the direction of France.

Utilities Commission News.

OHIO VALUATIONS.—Public utility corporations will not get all the time they desire in making reports of appraisal and inventory of their properties to the Ohio Public Utilities Commission. The Commission has allowed only two months extension to the Union Gas and Electric Company of Cincinnati, which asked for 6 months' extension. The report, under the original order of the Commission, would have been due Oct. 1. The Commission also informs the company that it will not stand for the great cost of making the inventory, of which the company complains. The company says that it is costing $4,000 a month. The Commission informs the company that if it is costing $4,000 a month it only can be concluded that "much valuable time has been lost by the company and the expense is unnecessarily high."

ST. JOSEPH RATE CASE.—Engineers and accountants in the employ of the Missouri State Public Service Commission have begun the valua tion of the physical property and audit of the St. Joseph Gas Company. This is the first investigation of its kind to be made under the direction of the Commission. Upon the result depends the Commission's action in connection with the city's effort to have reduced the company's rate of $1 per 1,000 feet for manufactured gas. The company's officials declare that, until the company is supplying manufactured gas exclusively, it will lose money on the $1 rate, because of the alleged great expense of starting up the plant during each shortage in the supply of natural gas.

ST. PAUL, MINN., GAS CASE.—The St. Paul Gas Light Company has given a bond to the city in the amount of $120,000 to secure the gas consumers in the city the return of all moneys charged for gas in excess of 85 cents per 1,000 feet, in case the city succeeds in having the 85-cent gas rate ordinance sanctioned by the United States District Court. The bond is good throughout the duration of the temporary injunction granted by Judge Wilbur F. Booth, restraining the city from putting the ordinance into effect until the result in the Federal Court is adjudicated. In case the city wins the suit, a return of 5 cents per 1,000 feet of gas consumed will be made each customer under direction of the United States District Court.

KANSAS COMMISSION UNPOPULAR.—The fate of the Public Utilities Commission, of Kansas, may be determined when the 1915 Legislature meets in Topeka in January. With the Commission's power and jurisdiction under fire from a dozen angles, with a well-defined movement for the abolition of the Commission, the Democratic State Administration has taken up the battle for the Commission, and in its platform pledged its influence to an extension of the Commission's power. In the last few weeks not less than a dozen suits have been filed in the Shawnee County District Court, at Topeka, directed against the Kansas Commission. All of the cases have for their ultimate end the same purpose—the restriction and limitation of the power and jurisdiction of the Board.

PAY FOR MAIN EXTENSION.—A discussion of the obligation of a gas company to pay for extension of service mains is entered into by the State commission in a decision handed down September 1 in the case of Thomas B. Lawrence against the People's Gas Light and Coke Company, of Chicago. The petitioner wanted gas service to his residence and asked for a ruling from the commission to the amount of main extension which should be laid at the company's cost to supply prospective customers. The commission finds that the defendant company's gas main extension rules as at present in force are generally accepted as fair and reasonable and are based on common practice throughout the United States. Continuing, the commission says:

"Rules formulated by this commission for the regulation of gas utilities limit the length of free gas main to each consumer and hold that when and where a prospective customer petitions the utility for gas service from a low pressure gas main, the limit length to be laid at the cost of the utility shall be 100 feet. Any length beyond this limit shall be laid if the business that may reasonably be expected from such extension is sufficient in the opinion of the commission to grant a fair return on the investment, provided the petitioner shall previously deposit with the utility an amount sufficient to pay the cost of any such main in excess of the aforesaid free limit."

Financial Notes.

THE Old Colony Gas Co., has declared a regular quarterly dividend of 1¼ per cent. on preferred, payable October 1, to stock of record September 24.

THE Newton and Watertown (Mass.) Gas Light Company also increased its rate by declaring a dividend of 2¼ per cent. against 2 per cent. 3 months ago, placing stock on a 10 per cent. basis against 9 per cent. paid in last fiscal year, and 11 per cent. 2 years ago.

H. M. BYLLESBY & Co., announce the declaration of the usual dividends of 1¾ per cent. upon the preferred stocks of the following companies for the quarter ending September 30, payable October 15: Northern States Power Company; Western States Gas and Electric Company; and Ottumwa Railway and Light Company. Ottumwa.

THE President of the United Gas and Electric Corporation in referring to the deferred dividend, says: "The corporation has amply earned the current dividend on its first preferred 6 per cent. stock, and on Oct. 1 will have in hand more cash than is required to pay the same. In view, however, of the unprecedented disturbance in financial conditions, and the impossibility of foreseeing developments, the directors decided that the best interests of the stockholders of the corporation made the conservation of its cash resources advisable. It is evident from the above statement of earnings that under any other than pressing conditions there would have been no hesitation on the part of the directors in declaring the dividend."

THE combined net earnings available for dividends of the subsidiary concerns of the Massachusetts Gas Companies for August were $159,393, a decrease of $7,429, or 4.51 per cent. as compared with the corresponding month last year. The net earnings for the 2 months ended August 31 were $344,500 compared with $334,192 in the previous year.

THE Continental Gas and Electric Corporation's extension programme will be uninterrupted by the present financial condition, and the payment of dividends on common and preferred stock, which amount to approximately only one-third of the net earnings, will not interfere with the extension and additions now under way in the company. The construction budget for the next 6 months is $250,000, and the money available for this purpose, after all fixed charges and dividends are paid is $300,000.

GROSS earnings of the Mobile (Ala.) Gas Company for the 7 months ended July 30 were $126,570 or $14,620 larger than for the corresponding month of 1913. In 3 years, it is stated, gross earnings have increased more than 47 per cent.

THE Baltimore (Md.) Consolidated Gas, Electric Light and Power Company reports for year ended June 30: Gross income, 1914, $6,400,896; 1913, $6,114,973; net, 1914, $3,067,075; 1913, $3,151,793; surplus after dividends, 1914, $22,825; 1913, $104,353.

THE directors of the American Public Utilities Company have decided not to declare the usual quarterly dividend of ¾ of 1 per cent. on the common stock in view of the present financial conditions. The regular preferred stock dividend has been declared. At the beginning of the war in Europe the company had undertaken certain large construction work, and the board decided that these operations could not be carried forward without using funds available for common stock dividends.

WAR conditions so far have had little effect on the revenues of the Montreal Light, Heat and Power Company, as indicated by the fact that the figures for August showed an increase of $19,000 in surplus available for dividends over the same month a year ago. For the 4 months beginning May 1st, the increase in the amount available for dividends is close to $70,000. The company has naturally experienced a falling off in the demand for power in certain directions, owing to curtailment of operations by some industries, but enough new business has been developing to offset losses—and slightly better than that. Accordingly it is in the fortunate position of being able to maintain that growth of revenue which has been a steady feature of its business over a now long period of years. The company is going ahead uninterruptedly with the construction programme, funds for which were secured through the issue of stock last year. The new gas plant, designed for a daily capacity of four million cubic feet, will be completed about the end of November. The auxiliary steam plant for the power department was completed in August, and has worked very satisfactorily in test operations.